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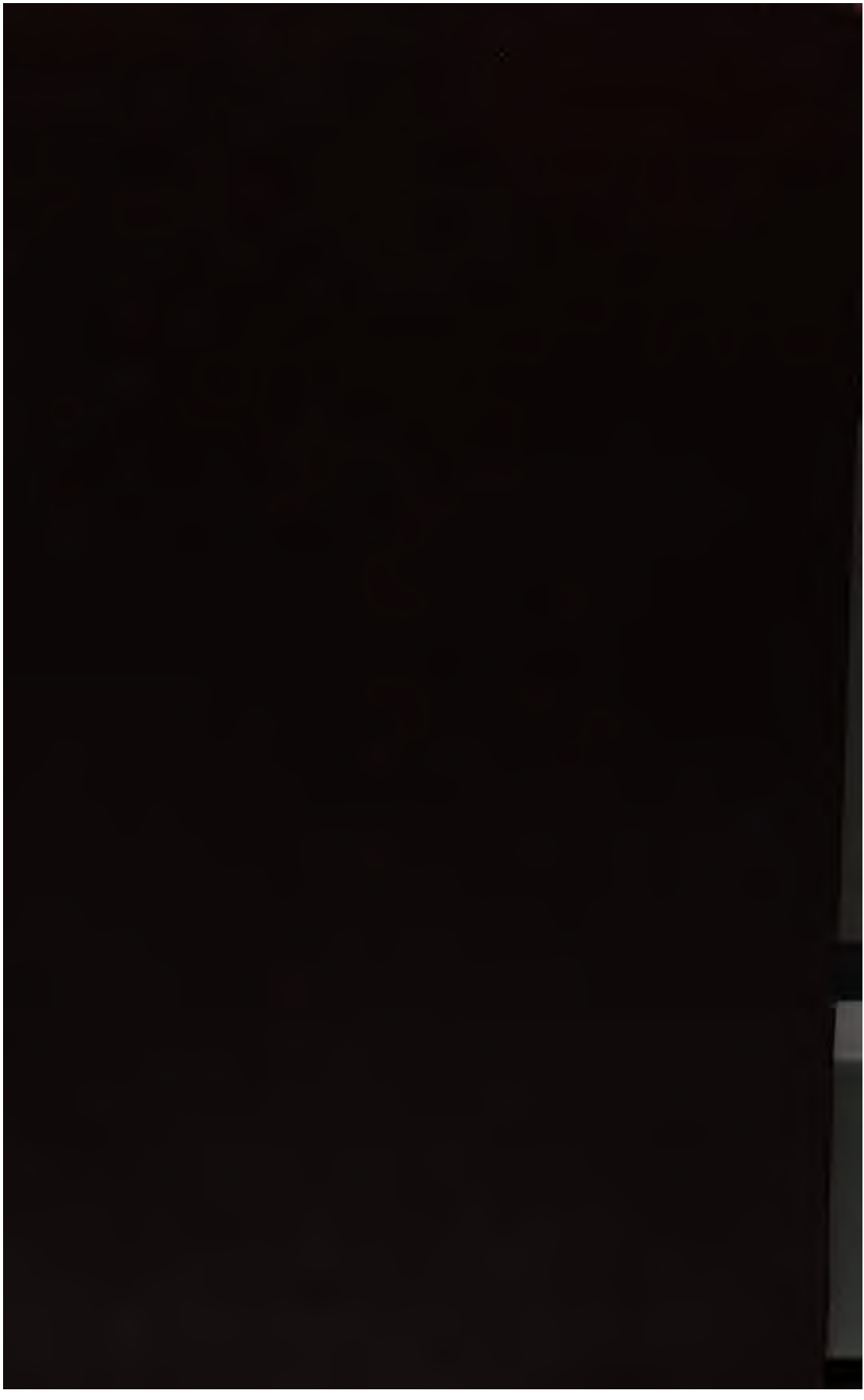

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A TREATISE ON MASSAGE

MANUAL THERAPEUTICS

A

TREATISE ON MASSAGE

ITS

HISTORY, MODE OF APPLICATION AND EFFECTS

INDICATIONS AND CONTRA-INDICATIONS

BY

DOUGLAS GRAHAM, M.D.

OF BOSTON, MASSACHUSETTS

MEMBER OF THE AMERICAN ASSOCIATION FOR THE ADVANCEMENT OF SCIENCE; OF THE AMERICAN MEDICAL ASSOCIATION; OF THE MASSACHUSETTS MEDICAL SOCIETY, ETC.

"The property by what it is should go, not by the title"

—*All's Well that Ends Well*

THIRD EDITION
REVISED, ENLARGED, AND
ILLUSTRATED

PHILADELPHIA AND LONDON
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By Douglas Graham

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DEDICATED

TO

THE MEMORY OF MY OLD PROFESSORS

OF

JEFFERSON MEDICAL COLLEGE

1870—1873

IN TOKEN OF ESTEEM FOR THEIR GREAT
LEARNING, DIGNITY, AND
ELOQUENCE

PREFACE TO THE THIRD EDITION

The first edition of this work was published in 1884, and, so far as the author is aware, was the first book on Massage in point of time in the English language. Since then the uses of massage have increased to such an extent, and the study of its effects has drawn so largely on the teachings of modern physiology, that it is difficult to compass the whole subject in a single volume, as is here attempted.

The history of massage is coeval with that of mankind and worthy of being preserved; its mode of application can be cultivated as an art second to none that the human hand can perform, having a harp of more than a thousand strings on which to play; its range of usefulness is increasing all the time, and has long since extended into every special and general branch of medicine, so that he who would keep pace with its developments must be well informed in all departments of the healing art. This book is written from the standpoint of the physician and practical *masseur,* from that of theory and practice, of faith and works. From any other point of view it would have been as one-sided and useless as if an architect who had never learned the use of tools should try to teach carpentry, or as if a carpenter who had never studied architecture should try to teach drawing and planning.

Eight new chapters have been added to the last edition of this work, and many alterations, additions, and subtractions too numerous to mention have been made; so that the reviewer who thinks he may find enough in the preface to save himself the trouble of reading the book will be very much mistaken.

While pictures give some idea of the correct or incorrect positions of the hands in doing massage, pressure and movement and

many other details can only be learned from an experienced teacher. What was said about this in the preface to the first edition may be repeated here: "It is hoped that the principles of massage are so clearly set forth in the following pages that they may be easily understood and made available by anyone who has sufficient knowledge of anatomy and physiology and acquaintance with the natural and morbid consistency of tissues. With this knowledge pictures are unnecessary; without it they are useless."

Illustrations of correct methods of applying the hands for massage in this work have been taken from photographs of the same on the living subject, for which I am indebted to my daughter.

Of late the manner of making books on massage has too often been to make a wholesale acknowledgment of indebtedness in the preface to various authors, and after that to take all that is wanted from them without either reference, name, or quotation-marks. It is not the way that this book has been made.

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A

TREATISE ON MASSAGE.

***

I.

Definition and History of Massage.

"They be the best physicians which, being learned, incline to the traditions of experience; or, being empirics, incline to the methods of learning."—BACON.

Definition.—Massage—from the Greek μάσσω, I knead or handle; Arabic, *mas'h,** press softly; Sanskrit, *makch,* to strike, to press, to condense—is a term now generally accepted by European and American physicians to signify a group of procedures which are best done with the hands, such as friction, kneading, manipulating, rolling, and percussion of the external tissues of the body in a variety of ways, either with a curative, palliative, or hygienic object in view. Its application should in many instances be combined with active, passive, assistive, or resistive movements, and these are often spoken of as the Swedish movement cure. There is, however, an increasing tendency on the part of scientific men to have the word massage embrace all these varied forms of manual therapeutics, for the reason that the word "cure," attached to any form of treatment whatsoever, cannot always be applicable, inasmuch as there are many maladies that preclude the possibility of recovery and yet admit of amelioration. Hence the word cure may lead people to expect too much; and on the other hand, the use of the word *rubbing* in place of massage tends to undervalue the application and benefit of the latter, for it is but natural to suppose that all kinds of rubbing are alike, differing only in the amount of force used.

---

* Hence those who inadvertently or through ignorance call *masseurs* "mashers" are oftentimes not so far out of the way after all.

History.—However massage may rejuvenate those who submit to its influence, the wrinkles of time cannot be removed from its own ancient visage. It is true they are sometimes forgotten, for so little attention have they received that Professor Th. Billroth, of Vienna, in 1875, and Dr. Wagner, of Friedburg, in 1876, stated that there were many physicians in Germany who had never even heard of massage, and that it was then an everyday question as to what it meant, some even supposing that Dr. Mezger, then of Amsterdam, was the originator of it.* Professor Billroth continues by saying: "I can only agree with my colleagues Langenbeck and Esmarch that massage in suitable cases deserves more attention than has fallen to its lot in the course of the past ten years in Germany. My old experienced surgical assistant has already obtained a series of results both favorable and surprising and far exceeding my expectations of this method of treatment." And yet for sixty years prior to this the word massage had found a place in the medical literature of France, and valuable articles had from time to time appeared on the subject. Professor Billroth says that massage is as old as surgery altogether. It being impossible to find out which is the older, perhaps it would be more exact to say that massage is as old as mankind. Its origin has well been spoken of as lost in the night of time, and its use as hoary with antiquity; for history informs us that massage has been partly practised from the most ancient times, amongst savage and civilized nations, in some form of rubbing, anointing, kneading, percussing, passive or mixed movements. Nor do we need to search far in order to account for this; for almost every one, when suddenly seized with a violent pain, instinctively and involuntarily seizes the painful place and attempts to relieve it by pressure or rubbing or both together, and usually with the result of subduing the morbid and over-excited action of the nerves and of preventing blood stasis and effusion.

From what follows it will be observed that those who have thought it worth while to record their appreciation of massage have, in almost every instance, been men of note, eminent as physicians or philosophers, poets or historians, "who have left their

* Wiener Med. Wochenschrift, No. 45, 1875; Berliner Klin. Wochenschrift, Nos. 6 and 12, 1876.

footprints on the sands of time," from the days of Homer and Hippocrates down to these of Dr. S. Weir Mitchell and Professor Billroth. Homer, about 1000 B.C., in the Odyssey tells us that beautiful women rubbed and anointed war-worn heroes to rest and refresh them. In another part of the Odyssey (l. iii. v. 446) we read: "Meanwhile she bathed Telemachus, even fair Polycaste, the youngest daughter of Nestor. And after she had bathed him and anointed him with olive oil, and cast about him a goodly mantle, he came forth from the bath in fashion like the deathless gods." And again (l. xxiv. v. 364): "The Sicilian handmaid bathed high-hearted Laertes and anointed him with olive oil, and cast a fair mantle about him." Such kindly marks of attention, we trust, were more for precept than example. Odysseus was more modest in accepting such hospitalities. "Then goodly Odysseus spake among the maidens, saying: 'I pray you stand thus apart, while I myself wash the brine from my shoulders, and anoint me with olive oil, but in your sight I will not bathe, for I am ashamed to make me naked in the company of fair-tressed maidens.'"

Among the old Greeks and Romans massage in some primitive form or other was extensively patronized by people of widely different classes, from the patricians, the wealthy, and the learned downward to poor, decrepit old slaves, and for the most diverse purposes; with some as a means of hastening tedious convalescence, with others as a luxury in conjunction with the baths, and with others still to render their tissues supple and enduring preparatory to undergoing severe tests of strength, so that strains and ruptures would be less likely to occur. It was also used after the exercises and struggles, especially by the gladiators, in order to stroke away the ecchymoses and to relieve the pains of the bruises as well as to reinvigorate them. Those who applied the rubbing and anointing were as different in character and qualifications as those who received it. Sometimes it was done by medical practitioners themselves, sometimes by priests, at others by slaves, but probably more often by those called *aliptæ* (from *alipes,* swift of foot, nimble), whose business it was to anoint the wrestlers before and after they exercised, and who took care to keep them sound and in good complexion.

In Athens and Sparta the gymnasium was a state institution frequented by any freeborn citizen. Solon, the Athenian law-

giver, 638-559 B.C., watched over it with jealous care and punished with death any slave detected within its sacred precincts. The gymnastics of the ancients were divided into athletic, military, and medical. Herodicus, one of the masters of Hippocrates, in the fifth century B.C., first proposed gymnastics for the cure of disease and the preservation of health. To such an extent did he carry his ideas that he compelled his patients to exercise and to have their bodies rubbed, and by this method he had the good fortune to lengthen for several years the lives of so many enfeebled persons that Plato reproached him for protracting that existence of which they would have less and less enjoyment.* Herodicus was not only a physician, but a pædotribe, *i.e.*, the officer acquainted with all the prescribed movements in the ancient gymnastics and who carried them into effect. He was induced to study gymnastics from a medical point of view, because he had been benefited by them, and unlike many physicians, by thus applying his own practice to himself, it is said that he cured himself of bodily weakness and ill health, and attained the age of one hundred years.†

Herodotus, 484 B.C., called by Cicero the Father of History, says that there were specialists in Egypt, a particular physician for each disease. "The art of medicine is thus divided amongst them; each physician applies himself to one disease only, and not more. All places abound in physicians; some physicians are for the eyes, others for the head, others for the teeth, others for the parts about the belly, and others for internal diseases." In a passage from Herodotus we are informed that after having poured upon the body a greasy mixture, each part ought to be rubbed, passing the hands from above downward. At the commencement the friction ought to be gentle and slow, then it should become rapid and accompanied with pressure, whilst towards the end the friction should again become gentle.

The writings of Plato abound with references, direct and indirect, to friction. His teacher, Socrates, 470-399 B.C., the Greek philosopher and representative of the finest Athenian culture, asserts that the first country which gave birth to men was Attica, the territory of Athens; and in proof of this he adduces the statement

* Hufeland's Art of Prolonging Life.

† Allgemeine Orthopädie, Gymnastik und Massage, von Prof. D. Friedrich Busch, Berlin.

that whatever brings forth offspring is provided by nature with food for that offspring. Now Attica, he says, is the native soil of wheat and barley, by which the race of men is most excellently and best nourished. And after this she caused to grow for her children olive oil, the assuager of pain. Here Socrates, by the mouth of Plato, esteems oil as only less necessary to human life than wheat and barley, referring to its use in the way of friction, which often does allay pain in a remarkable manner, but taken internally it has no such effect.* Pliny most distinctly says that amongst the errors which the Greeks imported into the gymnasium was the use of oil, which Anacharsis, a philosophic Scythian of the sixth century B. C., considered to be the medicine of madness, because the athletes seemed to be maddened by it. By the injudicious use of oil, I have seen patients made very angry, but never quite "mad." Nearly every substance capable of being rubbed on the human body has had wonderful curative virtues ascribed to it. Many of these, besides being intensely disagreeable, are doubtless worthless, and for the resulting benefit we must look for something that is common to them all, and this we find in their method of application, namely, the rubbing.

The wisdom of the ancients appears to great advantage in some of their remarks about rubbing, and it requires years of practical acquaintance with massage in order to fully appreciate them. Thus the aphorisms of Hippocrates, 460 to 380 B.C., on this subject embodied the wisdom of the past and presaged the development of the future to a greater extent than most ancient or modern writers on massage have shown any evidence of understanding. "The physician must be experienced in many things," says Hippocrates, "but assuredly also in rubbing; for things that have the same name have not always the same effects. For rubbing can bind a joint that is too loose and loosen a joint that is too rigid." † And again: "Rubbing can bind and loosen; can make flesh and cause parts to waste. Hard rubbing binds; soft rubbing loosens; much rubbing causes parts to waste; moderate rubbing makes them grow." This is the earliest definite information about massage, and its truth and meaning are fully realized when the necessary

* The Anatriptic Art, pp. 3 and 4.

† Hippocrates, "Peri Arthron," Littré, Vol. IV., p. 100.

previous conditions exist. Hippocrates was wiser than he was aware of, as we learn from the word that he used to designate the process of rubbing, namely, *anatripsis,* literally the art of rubbing up, and not down. In those days the circulation of the blood was not understood, the ancients supposing the arteries to be filled with air, and hence their name, which still clings to them. Though Galen more than five hundred years later won the honor of pointing out the fact that the arteries contain blood in the living body, but are for the most part empty after death, yet the circulation of the blood was not understood until discovered and demonstrated in the year of our Lord 1628 by the immortal Harvey, who lost his practice in consequence. The observations of Hippocrates must have been very accurate to discern that rubbing upward in the case of the limbs had a more favorable effect than rubbing downward, and doubtless in this manner he had experience in promoting the resorption of effusions; for it is now well known that upward friction on the limbs favors the return of the circulation, relieves blood stasis, and makes more room in the veins and lymphatics for the carrying away of morbid products. This affords an illustration of "science following art with limping pace," which so frequently happens in the practice of medicine.

By appropriate massage, passive and resistive movements, atrophied muscles, tendons, and ligaments would have their circulation accelerated and increased, and consequently their nutrition and innervation improved, so that they would become larger and firmer, thus binding closer a joint too lax and making it stronger. By the same means involuntary tension of the muscles, adhesions, effusions, and hyperplastic tissue may be removed, so that a joint stiff from such causes would become more flexible. Therefore the saying of Hippocrates, that anatripsis will bind closer a joint that is too lax and relax a joint that is too rigid, is not so paradoxical as it seems. These remarks also in part refer to the fact that "rubbing can make flesh and cause parts to waste" in its local application; but in its general application the same effects have been observed and much more fully referred to by Dr. S. Weir Mitchell in "Fat and Blood, and How to Make Them." People who have a normal quantity of adipose tissue sometimes lose much of it, to their detriment, by the excessive use of massage. But even this feature can sometimes be utilized to advantage in cases where fat is super-

abundant, soft, and flabby, with a want of tone and tension in the areolar tissue, and in these it will be found that hard rubbing binds. "Soft rubbing loosens" not only abnormally tough and *matted* conditions of the skin and superficial fascia, but also involuntary tension of muscles, both of which conditions, if looked for, may often be found generally as well as locally in overtaxed and debilitated people. Such a state of these tissues would seem to be a physical expression of too great mental tension which the patient, like his muscles, is unable to relax. And here comes the necessity of a careful discrimination; for if a patient whose condition corresponds to this should receive such vigorous rubbing as often passes for massage in these days, and the vigor of which would really seem to be necessary to relax the tenseness of the tissues, the trouble would in all probability be aggravated, for reflex action and consequently still greater tension would be excited by the pressure of rough friction and manipulation upon terminal nerve-filaments which are already in a state of irritation. Though it does not appertain to the history of massage, yet it may not be amiss to say here that an admirable preliminary measure in such cases is a warm bath, which is grateful and soothing to the patient, solicits the blood to the surface, softens the cuticle, and removes the epithelial débris, and also relaxes the skin and to some extent the tissues beneath it. "Moderate rubbing makes parts grow" implies that the tissues to be rubbed are insufficiently nourished, and that if they be immoderately rubbed, their vitality will be lessened, their natural nervous irritability exhausted, and a state of congestion induced highly unfavorable to their proper nutrition.

These brief sayings of Hippocrates on anatripsis serve partly to show at the same time why he was considered a man of transcendental genius and justly styled the "Father of Medicine," who, having raised the art from a system of superstitious rites practised wholly by the priests to the dignity of a learned profession, was then accused by his jealous contemporaries of having made too free use of the writings of others, and of having burned the collection to conceal his plagiarisms. It was supposed that he had ample opportunity to do this in his capacity as librarian of the famous medical school of Cos, of which he was also chief.

Cicero, the Roman orator, philosopher, and statesman, B.C. 106-43, considered that he owed as much of his health to his

anointer as he did to his physician. At the beginning of his career he was stopped by his infirm health, and for its restoration he travelled in Greece and Asia. In time he overcame his violent manner of speaking, which his feeble frame was unable to bear, and he met his death by assassination with greater bravery than could have been anticipated; all of which would indicate a marked improvement in his general health, and, from this, better control of his mind and nervous system, due in great part, we may certainly suppose, to the tonic and sedative effects of rubbing. Plutarch tells us that Julius Cæsar, B.C. 100-44, had himself pinched all over daily as a means of getting rid of a general neuralgia. The distinguished Roman physician Celsus, who flourished about the commencement of the Christian era, spoke wisely and well about rubbing in saying that it "should sometimes be applied to the whole body, as when an invalid requires his system to be replenished." And again: "Chronic pains of the head are relieved by rubbing the head itself. But far more frequently when one part is in pain another must be rubbed, particularly when we desire to *draw matter* from the upper or middle part of the body and therefore rub the extremities. A paralyzed limb is strengthened by being rubbed. If certain limbs only are rubbed, long and powerful rubbing may be used, for the whole body cannot soon be weakened through a part. But when weakness of the body needs this cure over its whole extent, it ought to be shorter and more gentle than local rubbing, so as only to soften the superficial skin, that it may be enabled the more easily to receive new matter from the food. A thing becomes constricted when we take away that which by its interposition produced relaxation, and softened when we remove that which caused its hardness, and filled, not by the rubbing, but by the food which afterwards penetrates to the skin which has been relaxed by a kind of digestion or removal of its tissue." For the purpose of dispersing local deposits, and thus relieving the pains occasioned thereby, Celsus says that "one must use friction also, particularly in the sun, and several times daily, in order that the matters which by their collection have produced the mischief, may be the more easily dispersed." The mistake with Celsus was that he advised friction for almost every disease, and sometimes contradicted himself, but not altogether without reason, as the following sentences show: "As rubbing is rightly applied after the

cessation of an illness, so it must never be used during the increment of a fever, but if possible when the body shall have been wholly free from it. A patient is in a bad state when the exterior of the body is cold, the interior hot with thirst: but, indeed, also the only safeguard lies in rubbing, and if it shall have called forth the heat into the skin, it may make room for some medicinal treatment."

The wise and able Emperor Hadrian, A.D. 76-138, who will be so well remembered as having built the wall from the Solway Frith to the Tyne, and whose reign was distinguished by peace and beneficent energy, one day saw a veteran soldier rubbing himself against the marble at the public baths, and asked him why he did so. The veteran answered, "I have no slave to rub me;" whereupon the emperor gave him two slaves and sufficient to maintain them. Another day several old men rubbed themselves against the wall in the emperor's presence, hoping for similar good fortune, when the shrewd Hadrian, perceiving their object, directed them to rub one another!

The health of the celebrated Roman advocate Pliny, which was never very strong, had been shaken by a severe illness the preceding year, A.D. 102. His life, he tells the emperor in one of his letters, had been in danger. He availed himself of a mode of treatment which, it is presumed, was much in vogue at that time. He procured the services of a medical practitioner who cured many of his patients by the process of rubbing and anointing, and so much benefit did he derive from the remedy that he asked the emperor to grant the physician, who was either a Jew or a Greek, the freedom of the city and the privileges of Roman citizenship.

The art of embellishing was much cultivated amongst the ancients, and for this purpose physicians did not disdain to make use of the palette, an ovoid disk terminating in a handle, with which percussion was done. For this reason Pliny likened them to schoolmasters. In the principal cities there were establishments to which slaves having some slight deformity were taken at the expense of their masters in order to undergo a course of treatment for the purpose of deceiving their buyers and to acquire the comeliness of figure which they lacked. The procedure was percussion by means of the palette. These places were considered to be of bad reputation, and sometimes women went to them secretly

to seek for that freshness and rotundity in which they were deficient, and their weakness yielding to their vanity, they endured the blows of the palette, which it was necessary to use at a great rate, and this was only interrupted by palpation, contrectation, and all the resources of *psellaphie,* a word supposed to be synonymous with massage.* Men used up by excess also resorted to these places for the rapidly revivifying effects of such treatment.

Martialis, of eminent literary fame, about the year of our Lord 100 refers to manipulation in the following words:

> " Percurrit agile corpus arte tractatrix
> Manumque doctam spargit omnibus membris."

Galen, A.D. 130-200, the most learned physician and the most accomplished man of his age, whose authority in medical matters was regarded in Europe as almost supreme for a thousand years, recommended friction in a great number of diseases, generally as auxiliary to other means. At Pergamus, his native city, he was appointed physician to the school of gladiators. He was deeply interested in exercises and friction, and laid down minute directions concerning the latter, part of which it would be well to remember at the present day. " If any one," says he, " immediately after undressing proceed to the more violent movements before he has softened the whole body, and thinned the excretions, and opened the pores, he incurs the danger of breaking or spraining some of the solid parts. There is danger also of the excretions, in the rush of moving spirits, blocking up the pores. But if beforehand you gradually warm and soften the solids and thin the fluids, and expand the pores, the person exercising will run no danger of breaking any part, nor of blocking up the pores. Hence, in order to insure this result, it is proper by moderate rubbing with a linen cloth to warm the whole body beforehand, and then to rub with oil. For I do not counsel the immediate application of the grease before the skin is warmed and the pores expanded, and, generally speaking, before the body is prepared to receive the oil; and this will be accomplished by a very few turns of the hands, without pain and moderately quick, having in view to warm the body without compressing it; for you will perceive while this is being done

* Dict. des Sciences Médicales, 1819.

a blooming redness running over the skin; and this is the time to apply the grease to it, and rub with bare hands, observing a medium hardness and softness in order that the body may not be contracted and compressed, nor loosened and relaxed beyond the fitting extent, but be kept in its natural state. And one should at first rub quickly, and afterwards, gradually increasing it, push the strength of the friction so far as evidently to compress the flesh, but not to bruise it. . . . In using friction preparatory to the gymnastic exercises, the use of which is to soften the body, the middle quality between hard and soft should prevail, and all else should take its fashion accordingly. . . . And I recommend the imposition and circumflexion of the hands to be varied, in order that all the fibres of the muscles, as completely as possible, in every part may be rubbed; for the opinion that transverse rubbing, which some call circular rubbing, hardens and condenses, and contracts and binds the body, but that perpendicular rubbing rarefies and dilates, and softens and unbinds, is a mark of the same ignorance from which proceed most of the other assertions made by gymnastic professors on the subject of rubbing."

Sudden and violent efforts at running, jumping, lifting, and the like, by those unaccustomed to them, especially if they have passed the meridian of life, are apt to cause rupture and strain of muscular and tendinous fibres, owing to a lack of suppleness in these tissues. It would be difficult to improve on the preventive treatment of such injuries advised by Galen. The multitude of modern greasers and bruisers, who are supposed to be doing massage, might profit by the hint of Galen as to the best time of applying unctuous materials; and those who attempt to explain their doings by calling tendons nerves, and other such nonsense, had better take heed to the criticisms of Galen on the assertions of gymnastic professors. No wonder that he took so much interest in exercise and kindred measures for the improvement and maintenance of health, for history tells us that till the age of thirty years he was weakly, but became strong and of good health by devoting several hours a day to bodily exercise, and in this way cured a host of sicknesses and weaknesses in others.

It is amusing to note to what an absurd extent some of these old writers carried their appreciation of rubbing, especially in the care of that canine domestic idol which too often takes the

place of the baby. Arrian, who probably lived about the year of our Lord 243, says: "And great is the advantage of rubbing to the dog of the whole body—not less than to the horse, for it is good to knit and strengthen the limbs, and it makes the hair soft and its hue glossy, and it cleanses the impurities of the skin. One should rub the back and the loins with the right hand, placing the left under the belly, in order that the dog may not be hurt from being squeezed from above into a crouching position; and the ribs should be rubbed with both hands; and the buttocks as far as the extremities of the feet; and the shoulder blades as well. And when they seem to have had enough, lift her up by the tail, and having given her a stretching let her go. And she will shake herself when let go, and show that she liked the treatment." (Arrian, "Cynegeticus.")

Aside from the beneficial effects of the friction, the stretching also is of value, for we know that people in health, as well as animals, stretch before and after sleep, and this is partly involuntary. The influence of alternately stretching and relaxing the fascia in favoring the flow of lymph has been most interestingly demonstrated outside of the living body, thus showing how one of the most important physiological processes is carried on, and the necessity of semi-involuntary movements taking place when rest or fatigue has kept a person too long in one position. But more of this hereafter in its proper place.

Oribasius, a Greek, who early acquired a high reputation and was taken by the Emperor Julian to Gaul as his physician, describes in wearisome detail the apotherapeia, or perfect cure, meaning the last part of the ancient gymnastics, which consisted of bathing, friction, and inunction for the purpose of obviating fatigue or curing disease. "The apotherapeia," says he, "has two objects, that of evacuating superfluities and of preserving the body from fatigue. The former is common to exercise considered as a whole, for we regard exercise as having two effects: that of strengthening the solid parts of the body and of evacuating the superfluities. The peculiar aim of apotherapeia is to combat and to prevent the fatigue which habitually follows immoderate exercise, and the nature of this aim will indicate to us how it is necessary to perform the apotherapeia; for if we propose to evacuate precisely the superfluities of the solid parts of the economy, which

after having been warmed and attenuated by exercise still remain in the system, we must use friction by many hands and varied with rapidity, in order that as much as possible no part of the individual whom we rub be uncovered. During the friction we ought to extend the parts which we rub, and besides, we will prescribe what we call retention of the breath. . . . We are of opinion, that it is well to extend the parts which we rub, so as to evacuate through the skin all the superfluities which find themselves between it and the subjacent flesh; and it is for the same reason that an important part of the apotherapeia consists in holding the breath, which causes tension of all the muscles of the chest and relaxation of those of the belly and of the diaphragm; and thus the excrements will be pushed downwards," etc., etc. If, in place of relaxation, Oribasius had used the word contraction, the cause would then have agreed with the result, but the muscles and their actions were not so well understood in those days as now. What he considered superfluities we would doubtless call excretions.

"But all the physicians and philosophers of antiquity knew no better means of strengthening the vital principle and prolonging life than by moderation; by the use of free and pure air and bathing, and above all by daily friction of the body and exercise. Rules and directions were laid down for giving gentle and violent motion to the body in a variety of ways, hence arose a particular art called the gymnastic; and the greatest philosophers and men of learning never forgot that the body and soul ought to be exercised in due proportion. This art of suiting exercise to the different constitutions, situations, and wants of man; of employing it above all as the means of keeping his internal nature in proper activity, and thereby not only rendering the causes of disease ineffectual, but also curing diseases which have already appeared, they indeed brought to an extraordinary degree of perfection."

It is astonishing how many there are who have thought that massage was indigenous to their own or some other country. Thus the pleasing statement that the manœuvres of massage have been imported into Europe from Syria, Palestine, and the East, in consequence of the crusades against the Saracens, would lead us to think that massage had not been heard of before that period in Europe. But it is more likely that it had fallen into neglect and been forgotten.

II.

History Continued.

"Vivifying old and neglected truths needs as much prophetic insight as to see new truths for the first time."

THE Greeks and Romans were not the only members of the Aryan family who practised rubbing in the early ages. Strabo tells us that the Indians contemporary with Alexander, 326 B.C., esteemed friction highly. "In the way of exercise," he says, "they think most highly of friction; and they polish their bodies smooth with ebony staves and in other ways. The king while receiving foreign ambassadors listens and is rubbed at the same time." In India, as in ancient Greece, the groom rubs his horse with his own naked hand, in consequence of which it is said that their horses have a much finer coat than the English, which receive such attention from currycomb and brush alone. Amongst the hygienic principles laid down in the "Ayur-Veda" ("Art of Life") in the early Sanskrit of the first century are these: One ought to rise early, bathe, wash the mouth, anoint the body, submit to friction and shampooing, and then exercise. The word shampooing is of Hindoo origin, and, however refreshing the process and applicable to the Turkish bath, it should not be used as a synonym for massage, which is a different, more graceful, and more effectual procedure.

Paracelsus, 1492-1541 A.D., professor of surgery at Bâle in 1526, a remarkable man, though often intoxicated and guilty of gross immoralities, in his "Liber de Vita Longa" extols the effects of friction on the human body as indispensable to health.

Ambroise Paré, 1517-1590 A.D., the most renowned surgeon of the sixteenth century, though not recognized by the faculty, as he was only a barber-surgeon,* the inventor of the ligation of arteries, which is the foundation of modern surgery, surgeon under four French kings, a devout Huguenot, but spared at the massacre

* Professor Gross narrates that when Ambroise Paré was a young man he lived with a noble family to do the shaving, the surgery, and to read the family prayers.

of St. Bartholomew on account of his great surgical skill,—good old Ambroise states in his works, which were published in 1575, that friction was in great esteem in his time. He describes three kinds of friction—gentle, medium, and vigorous—and the effects of each. In dislocations, he recommends that the joint should be moved about, this way and that, not violently, but in order to resolve the effused fluids and extend the fibres of the muscles and the ligaments, so as to facilitate the reduction. From this it is apparent that he knew the influence of passive motion in promoting absorption, the rationale of which has been so well studied by German physiologists.

Mercurialis, 1530-1606 A.D., an eminent Italian physician who graduated at Padua and later occupied a chair of medicine in that celebrated university, published in 1573 a treatise entitled "De Arte Gymnastica," in which he brings prominently forward the benefits to be derived from active, passive, and combined movements. Alpinus, 1553-1617 A.D., was a celebrated Italian botanist who occupied the chair of botany at Padua in 1593. In his "Medicina Ægyptia," Chapter XVIII., he says that frictions are so much in use amongst the Egyptians that no one retires from the bath without being rubbed. For this purpose the person is extended horizontally; then he is malaxated, manipulated, or kneaded, and pressed in divers manners upon the various parts of the body with the hands of the operator. Passive motion is then given to the different articulations. Not satisfied with *masséing,* flexing and extending the articulations alone, they exercise the same pressures and frictions upon all the muscles, the effect of which is thus described by Savary: "Perfectly *masséed,* one feels completely regenerated, a feeling of extreme comfort pervades the whole system, the chest expands, and we breathe with pleasure; the blood circulates with ease, and we have a sensation as if freed from an enormous load; we experience a suppleness and lightness till then unknown. It seems as if we truly lived for the first time. There is a lively feeling of existence which radiates to the extremities of the body, whilst the whole is given over to the most delightful sensations; the mind takes cognizance of these, and enjoys the most agreeable thoughts; the imagination wanders over the universe which it adorns, sees everywhere smiling pictures, everywhere the image of happiness. If life were only a succession of ideas,

the rapidity with which memory retraces them, the vigor with which the mind runs over the extended chain of them, would make one believe that in the two hours of delicious calm which follow a great many years have passed."

Fabricius ab Aquapendente was a pupil of Gabriel Fallopius, and later professor of surgery at Padua, where he enjoyed a high reputation for many years, from 1565 onward. Besides works on surgery, he was the author of a treatise, "De Motu Locali Secundum Totum," in which he again brought massage to honor. He most warmly recommended this treatment by rubbing, kneading, and scientific movements as a rational measure in joint affections.

Mary, Queen of Scots, was stricken down October 7, 1566, with a malignant, intermittent typhus fever, doubtless caused by fatigue and annoyance at the wretched conduct of her husband. She was very ill and sank rapidly. Convinced that her last hour had come, she calmly prepared for death. She forgave all who had in any way offended her, and craved pardon of all whom she had in the slightest aggrieved. Soon she became cold and rigid, her form straightened out, her pulse and respiration were no longer perceptible. All despaired of her save her physician, News, who, hoping against hope, continued to use violent frictions, and at length succeeded in restoring her to life. She then began rapidly to improve, but her death meantime had been reported in Edinburgh.*

Clement the Eighth, one of the greatest popes that the Church has ever had, was a great sufferer from gout in his hands and feet. His friend, Saint Philip Neri, was very fond of him and visited him as often as he could, but was frequently prevented from doing so by sickness or other causes. It was about Easter, 1595, that the Pope had an unusually severe attack and was ordered by his physician to keep his bed. When Philip heard of this he had a great desire to relieve him. He first prayed for the Pope with great fervor and then went to visit him. When he came into the room Clement was in so much pain that he could not bear anyone to touch the bed he lay upon, and he begged Philip not to come near to him. But Philip moved gently towards him and Clement again

* Life of Mary, Queen of Scots, by Donald McLeod.

entreated that no one should touch him. With a smile of affectionate sympathy Philip replied: "I am not sorry for the gout, Holy Father, for that compels you to rest; but I am very sorry for the pain you suffer. Your Holiness need not fear; let me do as I please." And without another word he seized the suffering hand and pressed it with great affection. The pain immediately disappeared, and Clement cried out: "Go on touching me, Father, it gives me the greatest relief." The Pope was thus healed, so it is said, and spoke of it as a miracle to the cardinals for examining bishops, and often adduced it as proof of Philip's sanctity. From that time forward, and even after Philip's death, whenever the Pope was suffering from gout he commended himself to Philip, and the pain was at once relieved.*

What seems remarkable to us is that one so delicate as Saint Philip should apparently exert such power of relief as we are led to suppose that he did in this case. Either the Pope did not commend himself to his Heavenly Father for relief, or, if he did, evidently it had less effect in relieving him than commending himself to Saint Philip. That the Pope's faith was sufficient to relieve him after the death of the Saint surpasses all the mind-cures and faith-cures of the present day, for they require a living and active agent through which to act on their patients or dupes.

In the "Miroir de la Beauté" of Guyon, 1615, exercise and friction are advised, and it is considered necessary to have the body rubbed gently by some person who has soft hands.

The illustrious Sydenham, 1624-1689, abandoned the routine system of practice then prevalent, and based his own upon the theory that there is in nature a recuperative power which ought to be aided and not opposed. An example of this is found in his saying that, if any one knew of the virtues of friction and exercise, and could keep this knowledge secret, he might easily make a fortune. This is fully exemplified at the present day, for in every city of the United States, and, indeed, of the whole civilized world, there may be found individuals claiming mysterious and magical powers of curing disease, setting bones, and relieving pain by the immediate application of their hands. Some of these boldly assert that their art, or want of art, is a gift from Heaven, due to some

* Life of Saint Philip Neri, Vol. II.

unknown power which they call magnetism, while others designate it by some peculiar word ending with pathy or cure, and it is often astonishing how much credit they get for their supposed genius from many of the most learned people. Let a fisherman forsake his boat, or a blacksmith his anvil, or a carpenter his bench, or a shoemaker his shop, and proclaim that he has made the wonderful discovery that he is full of magnetism and can cure all diseases, and be he ever so ignorant and uncouth, he is likely to have in a remarkably short space of time a large clientèle of educated gentlemen and refined ladies. It is not meant to imply that the previous occupation of these people is at all to their discredit, but were they capable of giving a rational explanation of their doings, the halo of mystery would be removed from around them, and their prestige and patronage would suffer a sudden decline.

Hoffman, 1660-1742, who was physician to the King of Prussia, we are not likely to forget so long as the anodyne which still bears his name continues to be so useful. In his "Dissertationes Physico-Medicæ," 1708, he says that exercise is the best medicine for the body, and that we cannot imagine how salutary and favorable to health it is, for it excites the flow of the spirits, and facilitates the excretions from the blood. He extols the passive, active, and mixed movements of the ancients as well as the apotherapeia already referred to.

In the year 1698 Paullini offered to libertines, as if they were sufferers (which no doubt they were), what he considered a very efficacious remedy. It was nothing more nor less than flagellation, percussion, and slapping; and probably this was not administered with half the severity it ought to have been, in order to produce other than palliative results. Rubbing the back was used by the ancients for sterility. The Roman ladies allowed themselves to be whipped with strips of leather in such cases. (Ovid.)

In 1780 Simon André Tissot, professor of clinical medicine at the University of Pavia, interested himself in massage, and wrote an "Essai sur l'utilité du mouvement ou des différentes exercices du corps et du repos dans la cure des Maladies," or "Gymnastique Médicinale et Chirurgicale."

A curious old book is that entitled "A Full Account of the System of Friction as Adopted and Pursued with the greatest Success in Cases of Contracted Joints and Lameness from Various

John Grosvenor, Professor of Surgery at Oxford (1742–1823).

Causes, by the late eminent Surgeon, John Grosvenor, Esq., of Oxford. With observations by William Cleobury, Member of the Royal College of Surgeons. Third Edition. With a Portrait and Memoir of the Author. Oxford, 1825." About a century ago Mr. Grosvenor was professor of surgery for many years at Oxford, where his skill and reputation became so great that he was soon in possession of all the surgical practice at Oxford and on every side of it within a radius of thirty miles. He was undoubtedly a man of ability, for, in addition to his extensive practice, he edited a newspaper during his breakfast hour, and rendered gratuitous services to the poor from eight to ten in the morning. He practised simply as a surgeon, and would not invade the province of a physician nor condescend to soil his fingers with the preparations of pharmacy. "In the latter period of his practice Mr. Grosvenor rendered himself celebrated throughout the kingdom by the application of friction to lameness or imperfections of motion arising from stiff or diseased joints. He had first used it with success in a complaint of his own, a morbid affection of the knee, and by degrees its efficacy was so acknowledged that he was visited by patients from the most distant parts of the highest rank and respectability, amongst others by Mr. Hey, the able surgeon of Leeds. Those who were benefited by the process pursued under his own immediate superintendence in cases of this sort, and from total inability have been restored to a free use of their limbs, were best able to attest his merits. That he was scarcely in any instance known to fail was perhaps attributable to the circumstance that he used his utmost efforts to dissuade from coming to Oxford every one of whose case, from previous communications, he entertained any doubt. Possessed at this time of affluence, he became very indifferent about business, and at a time of life when he was still capable of active exertions and his strength was but little impaired he began to contract his practice. For the last ten years of his life he had wholly given up his profession, except in the instances of his patients requiring friction." Mr. Grosvenor considered friction highly improper in all cases of inflammation, in scrofulous cases tending to suppuration, in cases of inflammatory gout and rheumatism, and useless in cases of true ankylosis. The cases in which he found this remedy most serviceable were contractions of the joints attended with languid circulation and thickening of the ligaments;

in those cases in which there is too great secretion of the synovial fluid in the joints; after wounds in ligamentous, tendinous, or muscular parts when the function of the limb is impaired; after violent strains of the joints; in incipient cases of white swelling; after fractures of the articulating extremities of the joints when stiffness remains after union; in cases of dislocation of the joint when the motion is impaired some time after reduction; in cases of paralysis; in cases of chorea combined with attention to the system; and in weakly people where the circulation is languid. The observations of Mr. Grosvenor have been, in the main, confirmed by others, most of whom evidently consider their own experience unique and unprecedented.

To Peter Henrik Ling, poet and physiologist, of Sweden, is given the credit of having instituted what is so well known as the "Swedish Movement Cure;" and in 1813 the Royal Central Institution was established at Stockholm in order that he might practise and teach his system of gymnastics, which were adapted to the well and the sick. Some regarded him as the inventor of this system of treating certain maladies, while others considered that he only made rational that which had been in use for many centuries amongst the Chinese and other Eastern nations. The latter is doubtless the more correct view, for one of his disciples states that Ling thought not, like his predecessors, of merely imitating the gymnastic treatment of the ancients, but he aimed at its reformation and improvement. But the former view served a useful purpose in stirring up the critics and opponents of Ling's method, who adduced testimony to show that the method of Ling is that of the Brahmins of India; is that of the Egyptian priests; is that of Asclepiades, of Pythagoras, and of Herodicus; is that of which Hippocrates, Celsus, Galen, Rufus of Ephesus, and other physicians, Greek and Roman, have preserved fragments for us; and that all the movements which Ling has indicated are described in an ancient book of the Chinese called the "Cong-Fou of the Tao-Ssé." The critics of Ling doubtless felt roused to righteous indignation from the following remarks of M. Georgii, one of his pupils, who was, perhaps, more enthusiastic than enlightened: "Let us speak of the series of movements invented and determined by Ling. Here the influence comes solely from without, and the patient submits to the mechanical impression. By passive movements or com-

Peter Henrik Ling (1766–1839).

municated movements Ling means such as pressures, frictions, percussions, *froissement,* or rumpling of the skin and subcutaneous cellular tissue, etc., motions and attitudes suitable to produce temporary or artificial congestion in an organ." ("Estradère du Massage," 1863.)

However the genius of Ling and the claims of priority made for him may have been disputed, there seems to be no doubt as to the merits of the system which he rescued from oblivion and by all accounts put upon a scientific basis. In the rooms of the Royal Central Institution at Stockholm persons of every condition and age, the healthy as well as the sick, executed prescribed movements. The number of those who adopted the use of the therapeutic movements increased every year, and among them were even physicians who in the beginning had been the most opposed to Ling. In 1844 the Supreme Medical Board of Russia appointed two members of the Medical Council to inquire into the merits of the movement and manipulation treatment as practised by M. de Ron, one of Ling's disciples at St. Petersburg, who had been using it then for a period of twelve years. From the highly commendatory report of the councillors we quote the following: "All passive movements, or those which are executed by an external agent upon the patient, as well as active ones produced by the effort of the voluntary muscles, and the different positions with the aid of apparatus or without it, are practised according to a strictly defined method, and conducted rationally, since they are based upon mechanical as well as anatomical principles. *Experience teaches us the usefulness of the institution, as many patients thus treated have recovered their health after having suffered from diseases which could not be cured by other remedies.* We must also mention the testimony of Dr. Bogoslawsky, who himself, after having been cured of a chronic disease at that institution, has practised diligently this treatment, and who, being appointed consulting physician to that institution, has since then had opportunities enough of observing and witnessing numerous cures." * In most of the large cities of this and other countries institutions similar to the original one at Stockholm are carried on, where movements and stirring up of the external tissues of the body by machinery are successfully

* Roth on the cure of Chronic Diseases, pp. 18 and 19.

employed. In a Japanese book called "San-Tsai-Tou-Hoei," published in the sixteenth century, there is a collection of engravings representing anatomical figures and gymnastic exercises; amongst these are pressure, percussion, and vibration, besides passive motion, all of which have been in use with the Japanese from the most remote periods. They are employed to dissipate the rigidity of muscles occasioned by fatigue, spasmodic contractions, rheumatic pains, and after the union of fractures. The Chinese expression "Cong-Fou of the Tao-Ssé" is applied to physicians who interest themselves as artists or workmen in mechanical therapeutics. The Chinese rub the whole body with their hands, press gently the muscles between their fingers, and give a peculiar twisting to the articulations. In place of bleeding their patients, they employ kneading and friction to put the blood in motion.

In bringing forward the last evidence to show that Ling's treatment did not originate with him, the history of massage has been allowed to drift from its chronological order. Let us return to it by giving our attention briefly to a "quaint and curious volume of forgotten lore" entitled "Illustrations of the Power of Compression and Percussion in the Cure of Rheumatism, Gout, and Debility of the Extremities, and in Promoting Health and Longevity. By Wm. Balfour, M.D., Author of Illustrations of the Power of Tartar Emetic in the Cure of Fever, Inflammation, and Asthma; and in preventing Phthisis and Apoplexy." Second edition, Edinburgh, 1816. Who can doubt the regularity of Dr. Balfour after reading this? But his brethren did not adopt his views so readily as he thought they ought to have done, and the following is a specimen of how he regarded them for their hesitancy: "Medical practitioners encourage their patients in giving perfect rest to parts affected with rheumatism and gout, till, as often happens, they change their actions altogether. It is incumbent on such practitioners to show that there is greater security to life in painful, rigid, and swollen limbs and in frequent and long confinement than in the free and equable circulation of the blood through every part of the body and in exercise in the open air. It is incumbent on them to show that life is more secure when the functions of the body are imperfectly than when duly performed. It is incumbent on them to show that disease is preferable to health, and more conducive to longevity. . . . It was observed by Lord Bacon that

knowledge more quickly springs from absolute ignorance than from error. It is much easier, surely, to instruct the ignorant than to convince the prejudiced. But in spite of the hostility that has been shown to the practice illustrated in the following pages, I have the satisfaction to see it adopted at last by physicians of the first eminence. It may with truth be affirmed that there never was an important improvement in the practice of medicine yet, but what met with opposition. Mercury, bark, cold affusions in fever, vaccination, all experienced it. . . . Percussion and compression have been objected to in gout on the score of repelling the disease from the extremities to vital organs. The objection has no foundation whatever, either in matter of fact or in the nature of things. Percussion, instead of repelling, creates an afflux of nervous energy and sanguineous fluid to the part. Vessels in a state of atony are thereby roused to action and circulation is promoted; and bandages support the vessels and enable them to perform their functions. Where fever is present I treat it on general principles." Dr. Balfour claimed for himself the originality accredited to Professor Grosvenor by his friends—that of discovering a new method of treatment—without inquiring if there were any previous data to start from. This fact, however, makes their testimony all the more valuable and unbiassed, which we can doubtless trust, for they were eminent practitioners in their day; and any one who reads their books would certainly say honest as well. Dr. Balfour's book is mainly made up of reports of cases of rheumatism, gout, neuralgia, sprains, and the results of injuries treated by means of percussion, deep rubbing, and firm compression with bandages. Many of these from a state of chronic suffering speedily got well, and few there were but received some benefit. The cases are well reported and interspersed with forcible and philosophical remarks. Those who claimed originality for using tight strapping in sprains a few years ago would have done well to have first consulted old Balfour.

The *Gazette des Hôpitaux* for 1839 makes known to us that in the island of Tonga, Oceanica, when a person is fatigued from walking or other exercise, he lies down and some of the natives practise divers procedures upon him known under the name of *Toogi-Toogi, Mili,* or *Fota.* The first of these words expresses the action of striking constantly and softly with the fist; the second

that of rubbing with the palm of the hand; the third that of pressing and squeezing the tissues between the fingers and the thumb. These manipulations are ordinarily done by females; and they contribute to diminish fatigue and pain, besides producing an agreeable effect which disposes to sleep. When they practise them with the intention of diminishing fatigue alone, the arms and legs are worked upon; but when there is pain in some place, it is the part affected or the surrounding parts where the operations are applied. In headache the skin over the frontal region and also that over the cranium is submitted to *Fota,* and often with success. Sometimes in cases of fatigue they make use of a process which differs from the proceeding ordinarily employed: three or four little children tread under their feet the whole body of the patient. The Turks, Egyptians, and Africans, according to Ardouin, use similar procedures; they rub and press with the fingers, and they knead all parts of the body. With the Russians, flagellation and friction by means of a bundle of birch twigs are resorted to after the subject has been well parboiled in a vapor-bath. A pailful of cold water is then dashed over him from head to foot, the effect of which is described as electrifying. After this he plunges into the snow, and thus tempers himself like steel to endure with impunity the rigorous climate. The Siberians and Laplanders also indulge in these luxuries.

It is somewhat remarkable that in France, the country which first gave massage its name and greatest impulse, this method of treatment should have become so much neglected for a while. For at least sixty years the word massage had found a place in the medical literature of France, but for twenty years very little attention had been paid to it until quite recently. In the summer of 1884 Professor Charcot told me that the physicians of Paris did not interest themselves much in massage, but he hoped that they would. This hope is being fulfilled, thanks to the labors of MM. Lucas Championnière, Tripier, Rafin, Norström, and others, and the former prestige of the French in this matter is now fully regained.

A paragraph from Estradère indicates sufficiently the state of massage in France in 1863: "Although numerous observations upon the benefits of massage in certain affections have been communicated to the Academy of Sciences and other learned societies;

although some physicians became alarmed at the enormous practice of an empiric by the name of Moltenot who *masséed* at Orleans in 1833, and entreated the Court of Justice for a sentence against him; although Récamier and his pupils, Séguin and Maisonneuve, had lectured upon massage before all the learned societies; although in these times the most distinguished physicians of Paris very often prescribe massage; yet for all that it is still under the domain of empiricism, because physicians are content with indicating its therapeutical results without interrogating anatomy and physiology for the reason of these results. Nevertheless this age has a tendency towards improvement, and already physiologists have given some satisfactory explanations of the effects of massage, passive and mixed movements." With the waning interest of the French physicians in the subject of massage, the Germans and Scandinavians have taken it up with renewed zeal, and from time to time have furnished instructive accounts of their experiments, successes, and failures. More than twenty years ago Dr. Mezger, of Amsterdam, treated the (then) Danish crown-prince successfully for a chronic joint-trouble by means of massage, which he used in a manner somewhat peculiar to himself and in accordance with the teachings of physiology and pathological anatomy. When the prince got well he sent a young physician to Amsterdam to study Dr. Mezger's method of applying massage, and soon after many old as well as young physicians visited the clinic of Mezger, and they all agreed that the so-called massage used in Mezger's manner and according to the indications which a very large experience enabled him to point out was a most worthy agent in various affections of the joints, besides in inflammations and neuroses. They considered that credit was due to Mezger for having improved massage in a physiological manner, and for having brought it to be acknowledged as a highly valuable method. The esteem in which this method of treatment is held by physicians and surgeons on the continent of Europe who interest themselves in the matter is tolerably well indicated by the following statement from *Schmidt's Jahrbücher:* "It is but recently that massage has gained an extensive scientific consideration, since it has passed out of the hands of rough and ignorant empirics into those of educated physicians; and upon the result of recent scientific investigations it has been cultivated into an improved therapeutical system, and

has won for itself in its entirety the merit of having become a special branch of the art of medicine." *

In 1870 Dr. N. B. Emerson gave a very interesting account of the *lomi-lomi* of the Sandwich Islanders. He describes it as a luxurious and healthful form of passive motion which the Hawaiians bestow upon one another as an act of kindness and which constitutes their crowning act of generous hospitality to a well-behaved stranger. When foot-sore and weary in every muscle, so that no position affords rest and sleep cannot be obtained, it relieves the stiffness, lameness, and soreness and soothes to sleep, so that unpleasant effects of excessive exercise are not felt next day, but in their stead a suppleness of muscle and an ease of joint entirely unwonted. Moreover, the *lomi-lomi* is capable of appeasing and satisfying that muscular sense of *ennui* which results from a craving for active physical exercise. The Hawaiians have an appreciation of the physiological wants of the wearied system which Dr. Emerson thinks it would be well for the people of other civilized nations to imitate. They have various ways of administering the *lomi-lomi*. When one is about to receive it he lies down upon a mat; and he is immediately taken in hand by the *artist* (as Dr. Emerson calls the person who *lomi-lomies*), generally an elderly and experienced man or woman. The process is spoken of as being neither that of kneading, squeezing, nor rubbing, but now like one, and now like the other. Those skilled in the art come to acquire a kind of tact that enables them to graduate the touch and force to the wants of different cases. The natives are such firm believers in it that they sometimes defeat by untimely manipulations the ends of the surgeon, who would secure perfect rest for fractures. The Hawaiians are a famous race of swimmers, and to a foreigner they seem amphibious. When wrecked they sometimes swim long distances, and if one of their number becomes exhausted they sustain him in the water and *lomi-lomi* him at the same time. When he is refreshed by this they all proceed on their watery way together. The people of the Sandwich Islands are of normal stature, strength, and size, but the chiefs are so much larger, handsomer, and more magnificent in muscular development that

* Since I first translated the above and put it in print, it has been used to adorn the circular of every humbug in the United States who wishes to make people believe that Turkish-bath rubbing and pounding constitute massage.

foreigners would think they belonged to a superior, conquering race did they not know otherwise. The chiefs are about twenty-five per cent. larger than the subjects. The only way in which Dr. Emerson can account for this is that they are better and more abundantly fed and have themselves *lomi-lomied.* How much of the virtues of the *lomi-lomi* are due to the principles of animal magnetism Dr. Emerson leaves to those to determine who are versed in the matter. Who are they?

Nordhoff, in his book on "Northern California, Oregon, and the Sandwich Islands," published in 1874, gives the following graphic description of *lomi-lomi:* "Wherever you stop for lunch or for the night, if there are native people near, you will be greatly refreshed by the application of *lomi-lomi.* Almost everywhere you will find some one skilled in this peculiar and, to tired muscles, delightful and refreshing treatment. To be *lomi-lomied* you lie down upon a mat or undress for the night. The less clothing you have on, the more perfectly the operation can be performed. To you thereupon comes a stout native with soft, fleshy hands, but a strong grip, who, beginning with your head and working down slowly over the whole body, seizes and squeezes with a quite peculiar art every tired muscle, working and kneading with indefatigable patience, until in half an hour, whereas you were weary and worn out, you find yourself fresh, all soreness and weariness absolutely and entirely gone, and mind and body soothed to a healthful and refreshing sleep. The *lomi-lomi* is used not only by the natives, but among almost all the foreign residents; and not merely to procure relief from weariness consequent on over-exertion, but to cure headaches, to relieve the aching of neuralgic and rheumatic pains, and by the luxurious as one of the pleasures of life. I have known it to relieve violent headache in a very short time. The chiefs keep skilful *lomi-lomi* men and women in their retinues, and the late king, who was for some years too stout to take exercise, and yet was a gross feeder, had himself *lomi-lomied* after every meal as a means of helping his digestion. It is a device for relieving pain and weariness which seems to have no injurious reaction and no drawback but one—it is said to fatten the subjects of it."

There is no longer any doubt about this drawback, which has been turned into a pull-forward by the eminent neurologist, Dr.

S. Weir Mitchell, of Philadelphia, who in 1877 gave the profession and the public a careful and interesting account of his successful methods of treating thin, nervous, anæmic, and bed-ridden patients, usually women. The methods comprise an original combination of previous well-known agencies: namely, seclusion, rest, and excessive feeding made available by rapid nutritive changes caused by the systematic use of massage and electricity. When "Fat and Blood and How to Make Them" first appeared, not a few men suffering from lack of occupation, and consequent slight or imaginary ills, regretted that they could not have some intractable uterine malady, so that they might become interesting and undergo the fashionable and luxurious treatment which even without the electricity and imperfectly carried on has proved an effectual remedy from time immemorial for the depressing influence of the sloth and immorality of the chiefs of the Sandwich Islands. The grandees of Spain are said to be diminutive and decrepit. They do not have any such procedure as *lomi-lomi* applied to them.

It has always seemed to me that "Nerve and Muscle and How to Strengthen Them" would have been a much better and less sensational title for Dr. Mitchell's book than "Fat and Blood and How to Make Them," for the reason that there are cases that lose adipose tissue to their advantage under massage. The favorable results of Dr. Mitchell, in the class of cases which he has referred to, have been confirmed by Professor W. S. Playfair, of King's College, London, and published in a little book under the title of "The Systematic Treatment of Nerve Prostration and Hysteria," 1883. Professor Playfair clearly shows that certain hitherto intractable cases, usually complicated with primary or secondary uterine trouble, get well or improve remarkably under these general measures of rest and feeding, massage and electricity, administered while the patient is removed from the over-indulgent sympathy and interference of relatives and friends. Some of Professor Playfair's brethren, whose opinion he values highly, think it would be better that patients should remain invalids rather than be cured by such means, referring especially to massage, which to their minds savors too much of quackery. "To my mind," says Professor Playfair, "quackery does not consist in the thing that is done so much as the spirit in which it is done. The most time-

honored and orthodox remedies may be employed in such a manner, and by men boasting of the highest qualifications, as to be fairly chargeable with this taint. That we should be debarred from the use of such potent therapeutic agents as massage or systematic muscular exercise or electricity or hydro-therapeutics and the like because in unworthy hands they have been abused, seems to me almost worse than absurdity." On the other hand, not a few of the profession applaud Dr. Mitchell and Professor Playfair in a manner that would lead us to infer that they are to be considered the original inventors of massage and give their whole, sole, and exclusive attention to it and the cases in which it is useful. With equal propriety might they be regarded as experts in chemistry and materia medica because they use medicine as well as massage, or specialists in electricity because they have called largely on this remedial agent to assist them. Even Dr. Mitchell's own valuable testimony in treating some of the consequences of nerve injuries by massage during the war in the United States from 1861 to 1865 has been entirely lost sight of in the burst of blind enthusiasm over his more recent experience. But two points of ebullition need be referred to, for the rest can be judged of from what has previously been said.

(1.) In the *American Journal of the Medical Sciences* for January, 1878, the reviewer of "Fat and Blood," in language more elegant than useful, says, "Although it has been noted by Trousseau that the increased warmth of the skin produced by massage is due to the more active cutaneous circulation, it was reserved to Dr. Mitchell to put this point on an exact scientific basis by a series of accurate thermometric observations." No doubt of the accuracy of the thermometric observations; but what of their value? Let the author speak for himself: "It is well to add," says he, "that the success of the treatment is not indicated in any constant way by the thermal changes, which are neither so steady nor so remarkable as those caused by electricity." However interesting these changes may be, it is worth while to know that they may be safely disregarded in the cases referred to. But this hardly meets our expectation aroused by the statement of Dr. Mitchell that he had some facts to relate in regard to massage which were not known, he thought, on either side of the Atlantic. (Chapter V., "Fat and Blood.")

(2.) Dr. Coghill, in an address before the British Medical Association, said: "It seems to me that the systematic treatment of neurasthenic disorders, practised with such success by Dr. Weir Mitchell, of Philadelphia, and so recently brought to the notice of the profession with such a corroborative record of success by Professor Playfair, offers an alternative to Battey's operation of the most promising kind." Professor Playfair adds: "Here is just that sort of misapprehension which is certain to lead to disappointment, for a purely neurasthenic case is not one for Battey's operation."

A method of curing the sick amongst the Navajo Indians of Arizona is given by James Stevenson in the "Ceremonial of Hasjelti Dailjis," in the eighth annual report of the Bureau of Ethnology, Washington, 1891, from which the following abstract is made. For a prehistoric, antediluvian performance in modern times it surpasses anything I have yet found:

"During his visit to the Southwest in the summer of 1885 it was Mr. Stevenson's good fortune to arrive at the Navajo Reservation a few days before the commencement of a Navajo healing ceremonial. The ceremony was to continue nine days and nights. The occasion drew to the place about twelve hundred Navajoes, on an extensive plateau near Keane's Canyon, Arizona. A variety of interesting occurrences attended the great event, such as mythologic rites, gambling, horse- and foot-racing, general merriment, and curing the sick, the last being the prime cause of the gathering.

"A man of distinction in the tribe was threatened with loss of vision from inflammation of the eyes, which was supposed to have arisen from his looking upon certain sacred masks with an irreligious heart. He was rich and had many wealthy relatives, so they 'soaked it to him.' A celebrated theurgist was solicited to interfere. He arrived October 11, 1885.

"A bright light burned in the lodge, and shortly after dark the invalid appeared and sat upon a blanket in front of a song-priest. Three men personated the gods, Hasjelti, Hostjoghon, Hostjokobon, and one the goddess, Hostjoboard. They left the lodge and put on their masks.

"On the second day, after singing and chanting and pouring medicine from a gourd on heated stones, Hasjelti lifted the coverings from the entrance to the sweat-house, and the patient, having

donned his breech-cloth, came out and sat on a blanket. Hasjelti then rubbed the invalid with the horn of a mountain sheep held in the left hand and in the right a piece of hide from between the horns of the sheep. The hide was held flatly against the palm of the hand, and in this way the god rubbed the breast of the invalid while he rubbed the back with the horn, occasionally alternating his hands. After this Hostjoghon put the invalid through the same 'course of sprouts.' The gods then gave him drink four times from the gourd containing medicine-water, composed of finely chopped herbs and water, from which they had first taken a draught themselves.

"On the third day the same procedures, with variations, took place. This time Hasjelti began with the limbs, and as he rubbed down each limb he threw his arms towards the eastern sky and cried 'Yo, Yo!' He also rubbed the head and body, holding the hands on opposite sides. After this the sick man again drank from the bowl of medicine-water.

"On the fourth day, after the invalid had drunk of pine-needle water and been bathed with the same, Hasjelti manipulated the right leg with the sheep's horn and hide, rubbing the upper part of the leg with the right hand and the lower part with the left; then the sides of the leg in the same manner, each time giving a hoot. The arms, chest, face, and head were similarly manipulated, and every time he changed the position of his hands he gave a shout.

"On the eighth day the hands were placed to the soles of the feet, varied with hooting, then 'the heart of the invalid was touched' with the palm of the right hand, the left being placed upon the back. The body was pressed in this way four times amid loud cries. After touching each figure of a sand-painting, the right hand was placed to the forehead of the invalid and the left hand to the back of his head and the head pressed this way on all sides."

Many other details are given, but quite enough has been said. Whether the invalid was killed or cured does not appear. At any rate his pocket must have been touched, seeing that he had to pay for all this racket, including the entertainment of the twelve hundred Navajos.

General massage for its tonic and sedative effects is almost unknown on the continent of Europe, except in the most ordinary

form of rubbing. In the summer of 1889 I could find no one in Amsterdam to give me general massage to rest me from the fatigue of travelling. It has been used for this purpose, as well as to overcome fatigue from other causes, more or less skilfully in the city of Boston for the past thirty years.

From this outline of the history of massage we may conclude that, like many other matters in and out of medicine, it has not been steadily progressive, at times being highly esteemed, at others treated with indifference or even contempt, until the weight of eminent authority or the pressure of popular opinion has again raised it from oblivion.

Dr. J. B. Zabludowski, Professor of Massage at the University of Berlin. 1902.

III.

Mode of Applying Massage.

"Vor den Wissenden sich stellen
Sicher ist's in allen Fällen."

A CAREFUL study of the structure of the human body, its contours and conformations, together with the most agreeable and efficacious manner of applying massage to it, results in proving that the Creator made the body to be manipulated and that He put it into the heart of man to devise massage as a means of arousing under-action of nerve, muscle, and circulation. Few there are who have taken any special interest in massage but think they have improved it in some way peculiar to themselves, apparently unmindful of the words of the Father of Medicine, who said that "Medicine hath of old both a principle and a discovered track, whereby in a long time many and fine discoveries have been discovered, and the rest will be discovered, if any one who is both competent and knows what hath been discovered, start from these data on the search. But whoever, rejecting these and despising all, shall undertake to search by a different track and in a different manner, and shall say that he hath discovered something, will be deceived himself and will deceive others." According to Hippocrates, then, not a few have deceived themselves and others in the use of massage from want of starting from previous data on the search. But if the patients are benefited, no harm will come of this. Dr. Mitchell refers his first interest in this subject to the remarkable results obtained from its use by a charlatan in a case of progressive paralysis.* The description he has given of its mode of application in "Injuries of Nerves" and in "Fat and Blood" is excellent so far as it goes, but it is not by any means sufficient. Dr. Playfair says he never troubles himself as to how massage is done, and he thinks the details are not of much consequence, provided the operator produce in his patient the waste of tissue which is essential. Let Dr. Playfair or any one else

* Fat and Blood, p. 51.

become the patient, and he will be very apt to think in a short time that the details are of considerable importance so long as the power of sensation is intact. If in a sufficient time the results are not favorable, Dr. Playfair considers the manipulator at fault and gets another. When improvement does not follow in due time, Dr. Otto Bunge, of Berlin, takes a wider view and considers that either the massage is not properly done, or else that the case is not a suitable one for such treatment. He candidly confesses that he treated his patients too vigorously with massage when he first tried it, and they left him.

Professor Playfair thinks that work of this kind ought not to be expected of the nurse, as she has enough to do in attending to her other duties; and, moreover, that it requires very intelligent persons to do massage properly, and even amongst these the aptitude for the work he finds to be very far from common. Hence we may infer that Professor Playfair considers it of no consequence and also of great consequence as to how and by whom massage is done.

One author says that massage is difficult to describe, and that the word embraces too little; another agrees with the first as to the difficulty, but thinks the word embraces too much; while neither troubles himself to give an exact outline of the procedure. To furnish a description of the mode of applying massage is not an easy matter, and one less experienced in expressing himself than Professor Playfair might, like him, shrink from the task. But the writer of this has already made the attempt to describe general massage in an article published in the *Popular Science Monthly* for October, 1882, and he feels amply repaid for his trouble in having received the thanks of Professor Playfair himself. It is to be regretted that physicians do not oftener try their hands at massage themselves. They would be fully indemnified for their time and trouble in the improvement of their *tactus eruditus,* which would enable them to appreciate the changes in the tissues brought about by massage, and this would open a new and interesting field of observation to them. Furthermore, the benefit of their visit would then be immediate in place of mediate, as when it is the medicine prescribed and not the physician that does the work; and a still greater reason is that they would often prevent their glory from departing to another, and that other frequently

an ignorant and obnoxious layman, whom the physician is obliged to tolerate or lose the family practice. Visits for massage are not more arduous than many of the visits in surgical, obstetrical, and gynæcological practice; indeed, often less so, besides being much less disagreeable. Physicians daily render service that no menial could be hired to perform. French, German, and Scandinavian physicians often apply massage themselves without any thought of compromising their dignity; and when such men as Drs. Brown-Séquard, S. Weir Mitchell, Edward H. Clark, Samuel G. Webber, and others have sometimes tried their hands at it, I do not see why American and English physicians should not make use of it themselves oftener than they do.

Except among very few, epicures in this matter, if one may say so, there is as yet but little evidence of a desire to place massage and those who do it on their merits alone, irrespective of the policy of employing persons who are only rubbing machines or tolerating peculiar people with strange notions, so long as the poor patients' minds are satisfied. This is too often the case, and then massage is said to have failed and valuable time is lost, whereas, if it had been properly applied, it might have been successful; or, on the other hand, perhaps it should have been omitted altogether and other remedies employed. In Boston and Philadelphia, and perhaps in other cities as well, efforts have been made by physicians who are thoroughly familiar with massage to instruct intelligent nurses and others how to apply it, and at the training-schools for nurses the pupils receive some general instruction in the matter. In this way something has been done to bring massage within the rules and regulations of common sense and rational therapeutics. But still there is great room for improvement, even in this direction, for it is but too often the case that after one or two persons are specially trained to do massage they are requested to give instruction to some of the pupils at the schools for nurses and to others, a few of whom, after having received some general desultory lessons, are in turn delegated or relegated to teach others, and so on, until by the time massage reaches the needy patients there is often little left of it but the name. Hence it is not to be wondered at that many a shrewd, superannuated auntie and others who are out of a job, having learned the meaning of the word massage, immediately have it printed on their cards and

continue their "rubbin'" just as they have always done. In justice to many intelligent nurses, however, it should be said that even after they have had some lessons in massage at a hospital they will decline to try to use it, saying that they do not know enough about it. An eminent surgeon of Boston advised an equally eminent physician to get a neat Irish girl to rub his leg for a stiffness that followed muscular rupture. The advice was not taken, but enjoyed as a joke. This is but one illustration of many, showing how frequently massage is left to some one who, like Don Quixote's lady Dulcinea del Tobosa, had the best hand for salting pork in all the Tobassas, and charms which, though hid from view, might nevertheless be dwelt on in silent admiration. It is a very common mistake to suppose that those who are of a remarkably healthy, ruddy appearance, plethoric and fat, are the best fitted to do massage. Such people require a great deal of exercise in the open air for the proper oxygenation of their blood, and confining indoor work like massage they soon find to be tedious and irksome. Besides, the stooping attitude and varying positions necessary while doing this sort of work soon put them out of breath; and thus, while suffering from their own ignorance and awkwardness, they fancy they are imparting "magnetism" to their patients at their own expense. Fat people with broad shoulders and short arms are at a great disadvantage in trying to do massage. Still, I have seen a few stout people who were excellent manipulators. Better that the manipulators should be rather thin, though if of too spare a habit their hands will not be sufficiently strong and muscular, and their tissues will lack that firmness so necessary for prolonged endurance. It has been well said that "those who do massage should be tender and gentle, yet strong and enduring." Those who have a natural tact, talent, and liking for massage, with soft, elastic, and strong hands and physical endurance sufficient to use them, together with abundance of time, patience, and skill acquired by long and intelligent experience, are very useful artists in this department of the healing art, but not likely to be appreciated without the preposterous claims of "magnetism." Dr. E. C. Seguin, in the *Archives of Medicine* for April, 1881, said that even in New York there are few manipulators who can be trusted to do massage well. Non-medical people may become expert and skilful in the individual manœuvres

embraced under the term massage, but they ought to have their efforts directed by a physician. Physicians, in addition to want of time, may lack the necessary qualifications for doing massage well; but they would often find it to their advantage to be their own mechanics as well as architects in this, as already intimated.

There are undoubtedly some people who have a natural tact for doing massage, as there are others who have more than usual tact for doing other things, but where fifty or a hundred may claim this tact, there may not be one who really possesses it. I have often seen persons who, on account of the natural conformation of their hands, would never make good manipulators. Though Turner, the famous painter, held a professorship of perspective for over thirty years, yet he lectured very little, and then only to the mystification of his hearers, who could make nothing of his blind attempts at explanation. His knowledge of perspective was a matter of intuition and could not be measured by line or rule, and he who could develop perfect distances in his pictures failed to explain them orally. In the practice of massage, the writer knew a character very much like Turner in painting, who, claiming to be the originator of his method, manipulated with a skill surpassing anything he was aware of or could describe. "Entanglement of the nerves" was his diagnosis of every case, and he manipulated enthusiastically with the idea that he was straightening them out. In spite of his having been at variance with all the physicians in Christendom, he had for many years a large patronage; and an account of his successes and failures, if it could be obtained, would be far more interesting and instructive than is Dr. Wharton P. Hood's book "On Bone-Setting, So-Called," the hero of which explained every joint affection by saying that a bone was out.

The vaguest generalities still exist as to the manner of doing massage, even amongst the best authors on the subject, and, after having studied and tried the methods of almost all, the writer proposes to formulate as well as he can what he has found to be of value, without having adopted the methods of any in particular. But no matter how precisely and carefully worded the description may be, it is not likely to be comprehended unless one sees, feels, and attempts to do massage himself and compares his efforts with those of others; for massage, though it may be studied as a science, has, like everything else in medicine and surgery, to be practised

as an art, and the same may be said of this that Dr. John Hilton said of surgery: there is much that cannot be systematized, that cannot be conveyed from mind to mind in books and articles.

People might as well think that they could learn to swim, skate, ride the bicycle, play the piano, or paint pictures by looking at pictures of these acts as to think that they could learn to do massage from illustrations on paper. Nevertheless, some idea can be gained from pictures of the correct or incorrect position of the hands as to whether they are economizing time, space, and effort or not; but pressure and movement and many other details can be learned much better from an experienced teacher, and, indeed, it is almost the only way. Most of the recent publications of the position of the hands in doing massage deserve a prize for awkwardness.

The definition and manner of doing massage is not rendered any clearer by calling slow and gentle stroking in a centripetal direction *effleurage;* or by speaking of deep-rubbing as *massage à friction;* or by using the term *pétrissage* for deep manipulation without friction, or by calling percussion *tapotement.* But custom having sanctioned the use of these words, it becomes necessary to mention them.

The multiform subdivisions under which the various procedures of massage have been described can all be grouped under four heads, namely, friction, percussion, pressure, and movement. Malaxation, manipulation, deep-rubbing, kneading, or massage properly so called, is to be considered as a combination of the last two. Each and all of these may be gentle, moderate, or vigorous, according to the requirements of the case and the physical qualities of the manipulators. Some general remarks here will save repetition: 1. All of the single or combined procedures should be begun moderately, gradually increased in force and frequency to their fullest extent desirable, and should end gradually as begun. 2. The greatest extent of surface of the fingers and hands of the operator consistent with ease and efficacy of movement should be adapted to the surface worked upon, in order that no time be lost by working with the ends of the fingers or one portion of the hands when all the rest might be occupied. 3. If too near the patient, the manipulator will be cramped in his movements; if too far away, they will be indefinite, superficial, and lacking in energy. 4. The

patient should be placed in an easy and comfortable position, with joints midway between flexion and extension, in a well-ventilated room at a temperature from 70° to 75° F. Any sensations of tickling will soon be overcome by the effects of the massage if ordidinary tact be used. 5. What constitutes the dose of massage is to be determined by the force and frequency of the manipulations and the length of time during which they are employed, considered with regard to their effect upon the patient. A good manipulator will accomplish more in fifteen minutes than a poor one will in an hour, as an old mechanic working deliberately will accomplish more than an inexperienced one working furiously. 6. The direction of the procedures should almost invariably be from the extremities to the trunk, from the insertion to the origin of the muscles, in the direction of the returning currents of the circulation.

Friction or *effleurage* may be spoken of as circular and rectilinear; the latter may be vertical or parallel to the long axis of a limb; or horizontal, transverse, or at right angles to the long axis. Transverse friction is a very ungraceful and awkward procedure. It has been introduced on theoretical considerations alone, and may without loss be laid aside. A slight deviation from the method ordinarily recommended in doing straight-line friction I have found to be more advantageous; for though in almost every case the upward strokes of the friction should be the stronger so as to aid the venous and lymph currents, yet the returning or downward movement may with benefit lightly graze the surface, imparting a soothing influence, without being so vigorous as to retard the circulation pushed along by the upward stroke, and thus a saving of time and effort will be gained. The manner in which a carpenter uses a plane represents this forward-and-return motion very well. In giving a general massage, it is immaterial whether the upper or lower extremities be done first. Let us begin with the hands, and here a convenient extent of territory is from the ends of the fingers to the wrist, each stroke being of this length, the returning stroke being light and without removal of the hand. The rapidity of these double strokes may be from ninety to one hundred and eighty per minute. The whole palmar surface of the fingers in easy extension should be employed, and in such a manner that they will fit into the depressions formed by the approximation of the

phalanges and metacarpal bones, the patient's hand meanwhile resting in the other hand of the manipulator, the right in the right and the left in the left, as if placed for shaking hands. Six to a dozen up and return strokes may be made on as much of the surface of the back and palm of the patient's hand as that of the manipulator will cover. As there will be a small portion left undone, the hand, or rather the fingers of the manipulator, will be placed on this and treat it in a similar manner, while the greater portion of the surface previously worked upon will at the same time and by the same strokes be reviewed. The heel of the hand should be used for vigorous friction of the palm, done by a semicircular pushing movement, and the same can be done to the sole of the foot with somewhat less of the semicircular motion. The effect of this, when well done, is remarkably agreeable, and for this purpose the right hand of the operator should be used for the right hand and foot of the patient, and the left for the left, for in this manner they fit each other best. From the wrist to the elbow and from the elbow to the shoulder-joint are each suitable extents of surface to be worked upon, and here not only straight-line friction, extending from one joint to another, may be used, but also circular friction. The form of the latter which appears to me most serviceable, as it includes the advantages of the other two, is that of an oval, both hands moving at the same time, the one ascending as the other descends, each stroke reaching from joint to joint, the upward being carefully kept within the limits of chafing the skin, while they move at a rate of from seventy-five to one hundred and eighty each per minute, or one hundred and fifty to three hundred and sixty with both hands. It is well to begin these strokes on the inside of both arms and legs, so that the larger superficial and deep vessels may be first acted upon, as this influence extends at once, though indirectly, to their tributaries and ramifications. But it is not always practicable to place the hand of the patient on a support so that the operator can work with both hands on the arm. If not, as when the patient is lying down, then he can grasp the patient's right hand by its dorsum with his left while his other does oval friction on the anterior aspect of the arm. (See Fig. 4.) And for the back of the arm, the manipulator will grasp the patient's hand as in the act of shaking hands while his disengaged hand does the friction. (See Fig. 5.)

FIG. 4.—Friction of anterior aspect of the arm.

FIG. 5.—Position of hand for friction of the back of the arm.

FIG. 6.—Upward friction with each hand alternately on the back of the foot.

FIG. 7.—Friction of the sole towards the heel.

FIG. 8.—Upward friction of posterior and lateral aspects of the leg.

FIG. 9.—A good position of the hands for general manipulation of the foot.

Time, effort, and effect will be made the most of by doing friction upon the foot with the hands at right angles to it, one hand upon the dorsal aspect, and the other upon the sole, moving alternately and in a circular manner, the one ascending as the other descends. Friction can also be very effectually done on the back of the foot by the manipulator sitting in front of the patient, when alternate up-strokes can be easily made with each hand at right angles to the foot from the base of the toes to the ankle. (See Fig. 6.) Still sitting in the same position, one hand can grasp the back of the foot just behind the toes,—the left hand for the right foot, the right hand for the left foot,—while the other hand, mainly by its upper portion or heel, does vigorous friction on the sole from the base of the toes to the heel. (See Fig. 7.) Around and behind the malleoli will require a special pushing stroke with the fingers. As the lower limbs are larger than the upper, the lateral and posterior aspects from ankle to knee will form a convenient territory, while the lateral and anterior aspects will make another for thorough and efficacious friction. This will be best done with the knees semiflexed and the manipulator standing facing the patient for the posterior and lateral aspects (see Fig. 8), and after having completed the friction here, without stopping the strokes, he will turn with his back to the patient and continue the stroking on the anterior and lateral aspects, each thumb following the other with tolerably firm pressure over the anterior tibial group of muscles; but owing to the latter position of the *masseur* only upward friction can be done without the light downward stroke. While the hand on the inside of the leg is gliding from ankle to knee, the *masseur* can turn without losing a second of time or an inch of space.

The same systematic division of surface may be made above the knees as below, with the addition of another formed by the inner and anterior aspect of the thigh, and they may be dealt with in like manner; but the operator's back to the patient will on the whole be the easiest and most efficacious way of applying friction to the thighs. The number of strokes below the knees will vary from one hundred to one hundred and sixty with each hand; above, from sixty to one hundred. From the base of the skull to the spine of the scapula forms another region naturally well bounded for downward and outward semicircular friction, and from the spine

of the scapula to the base of the sacrum and crest of the ilium forms another surface over which one hand can sweep, while the other works towards it from the insertion to the origin of the glutei at an average rate of sixty or seventy-five a minute with each hand for a person of medium size. It will be observed that on the back and thighs the strokes are not so rapid as on the other parts mentioned, for the reason that the skin is here thicker and coarser, in consequence of which the hand cannot glide so easily, and the larger muscles beneath can well bear stronger pressure; besides, the strokes are somewhat longer, all of which require an increased expenditure of time. For more thorough and special *effleurage* of the side of the neck, as when we are dealing with an acute rheumatism of the upper part of the trapezius, it is well to make alternate strokes from the base of the skull downward and inward towards the chest, on the theory that the circulation takes the shortest route back to the heart. And when we desire more effectual friction on the hips we can make alternate strokes in a semicircular manner from the insertion to the origin of the glutei. Indeed, for this purpose one hand can make continuous friction in a circular fashion, while the other does the alternate supplementary semicircular stroke. The chest should be done from the insertion to the origin of the pectoral muscles, and the abdomen from the right iliac fossa in the direction of the ascending, transverse, and descending colon. But in these situations friction is seldom necessary, for the procedure about to be considered accomplishes all that friction can do and a great deal more. The force used in doing friction is often much greater than is necessary, for it should only be intended to act upon the skin, as there are better ways of influencing the tissues beneath it. If redness and irritation be looked upon as a measure of the beneficial effects of friction upon the skin, then a coarse towel, a hair mitten, or a brush would answer for this purpose a great deal better than the hand alone. But for intelligent variation of pressure, agreeableness of contact, and adaptability to even and uneven surfaces, no instrument has yet been devised to supersede the human hand. In union there is strength, and the fingers should be kept close together in doing friction and manipulation. But it is astonishing how persistently they are sometimes held out straight and spread far apart, reminding one of the feet of a frightened duck in a thunder-storm, and the sound of quack

suggests itself as appropriate for the one as the other. This would be still more appropriate when, as often happens, the hands are made to traverse the air to an undue extent, accompanied with a snapping of the fingers, reminding us of Mrs. Boffin's horses that stepped higher than they did long ways; and if with these ungraceful flourishes perspiration be mistaken for inspiration, and blind enthusiasm for "magnetism," there can be no doubt of the genus to which the operator belongs.

The useless flourishes of many while doing friction might impress an unitiated spectator as evidences of expertness. They bear the same relation to massage, pure, effectual, and agreeable, that the superfluities of architecture, known as the Queen Anne style, wherein comfort is sacrificed to beauty, bear to the classic detail of Greek architecture.

The advantages of ordinary rubbing are not to be despised, and by many this is supposed to be all there is to massage; but it is the least essential part of it. One of the old French dictionaries says there is reason to believe that massage has upon the skin the advantage of friction, that it acts above all upon the more deeply situated tissues, etc., thus implying that massage, properly so-called, is something different from friction, and yet has the same effect upon the skin, while exerting a more extended range of influence. By this we understand massage proper to be manipulation, deep-rubbing, kneading, or malaxation, which is certainly the most important, agreeable, and efficacious procedure of all. It is done by adapting as much as possible of the fingers and hands to the parts to be thus treated, and, without allowing them to slip on the skin, the tissues beneath are worked upon in a circulatory manner by a sort of kneading, rolling, squeezing, manipulatory motion, proceeding, as in friction, from the insertion towards the origin of the muscles, from the extremities to the trunk. For this purpose the same divisions of surface as for friction will be found most convenient. Beginning then with the fingers from the roots of the nails, the thumb of the manipulator will be placed on one of the fingers of the patient and parallel to it, while on the opposite surface the second phalanx of the index finger will be simultaneously placed at right angles to this, and between the two the finger of the patient will be compressed and malaxated at the rate of from seventy-five to a hundred and fifty per minute. The dorsal and

palmar surfaces will, of course, receive special attention, while the lateral aspects will come in for a secondary share. If the manipulator be sufficiently expert, he can work with both hands on this small surface, one in advance of the other, or he can take one of the patient's fingers in each of his own hands and proceed with the same rapidity as with one. Each finger and thumb will be taken in turn, and the manipulations extended over the metacarpal and carpal bones as far as the wrist-joint, and finally the palm of the hand will be done by stretching the tissues vigorously away from its median line. The muscles between the metacarpal bones are not very effectually reached by massage, but by pressing up with the fingers in the palm they can be tolerably worked upon by the thumb from the back of the hand. Each part included in a single grasp may receive three or four manipulations before proceeding onward to the adjacent region, and, indeed, three manipulations in one place and three times over the part that is being *masséed* makes a good general rule, here and elsewhere. The advance upon this should be such as to allow the finger and thumb to overlap one-half of what has just been worked upon. Advance and review should thus be systematically carried on, and this is of general application to all the other tissues that can be *masséed.* The force used here and elsewhere must be carefully graduated so as to allow the patient's tissues to glide freely upon each other, for, if too great, the movement will be frustrated by the compression and perhaps bruising of the tissues; if too light, the operator's fingers will slip; and if gliding with strong compression be used, the skin will be chafed. To avoid this last objection various greasy substances have been employed, so that ignorant would-be *masseurs* may rub without injuring the skin. When the skin is cold and dry or cold and moist, and the tissues in general are insufficiently nourished, as well as in certain fevers and other morbid conditions, there can be no doubt of the value of inunction; but no special skill is required to do this, and there is no need of calling it massage, unless it be to please the fancy of the patient. Removal of hair is entirely unnecessary. Massage can be done as effectually on the head as on any other part.

The feet may be dealt with in much the same manner as the hands (see Fig. 9), using the ends of the fingers to work longitudinally between the metatarsal as between the metacarpal bones, and

the tissues of the sole should be stretched vigorously away from the median line; and, lastly, the heel, accurately adapted into the palm of the hand and between the thenar eminences and fingers, will be worked upon in a squeezing, circulatory manner. Upon the arms and legs and, indeed, upon all the rest of the body, both hands can be used to better advantage than where the surfaces are small. Each group of muscles should be systematically worked upon, and for this purpose one hand should be placed opposite the other, and where the circumference of the limb is not great, one hand may be placed in advance of the other, the fingers of one hand partly reaching on to the territory of the other, so that two groups of muscles may be manipulated at the same time with grasping, circulatory, spiral manipulations, one hand contracting as the other relaxes, the greatest extension of the tissues being upward and laterally, and on the trunk, forearms, and legs away from the median line. It is needlessly wearisome to both patient and manipulator if the hands are kept closely adapted to a limb its whole length in doing this vermicular squeezing; besides, it produces a dragging sensation upon the skin and interferes with the circulation. To avoid this, it is only necessary to raise the hands slightly in advancing. Subcutaneous bony surfaces, as those of tibia and ulna, incidentally get sufficient attention (unless œdema be present) while manipulating their adjacent muscles, for if both be included in a vigorous grasp, unnecessary discomfort results. Care should be taken not to place the fingers and thumb of one hand too near those of the other, for by so doing their movements would be cramped. With the fingers and thumbs at proper distances from each other, not only are the tissues immediately under them acted upon, but those between them are agreeably stretched. The advance should be upon the previously unoccupied stretched region. Space and force will be indicated by the elasticity, or want of it, in the patient's tissues, the object being to obtain their normal stretch, and in this every person is a law to himself, the character of tissues varying with the amount and quality of adipose, modes of life, habits of exercise, etc. A frequent error on the part of the manipulator is in attempting to stretch the tissues in opposite directions at the same time, especially at the flexures of the joints, where the skin is delicate and sensitive, and where the temptation to such procedure is greatest because easiest, the effect being a

sensation of tearing of the skin. It is well to go over a surface gently and superficially before doing the manipulation more thoroughly and in detail. In the case of the forearm, the two hands will embrace the whole circumference, one in advance of the other, the thumbs occupying the median line, on the anterior aspect, while the fingers are on the back of the arm (Fig. 10), and after going over this in a three-times-three manner, the forearm should then be pronated and the thumbs placed on its back (Fig. 11), which will be similarly treated, the fingers meanwhile doing their share of the work. (Figs. 12 and 13.) The supinators should receive a special malaxation with the grasp of one hand. Above the elbow, one hand will seize and squeeze the biceps while the other alternately does the same to the triceps. (Fig. 14.) The median portion of the deltoid will receive most thorough attention from the thumbs placed parallel to its fibres, while the palms and fingers are engaged with the anterior and posterior aspects of the muscles, and after this its margins and the whole muscle can be well worked by seizing the muscle with the hand at right angles to its fibres.

In manipulating a leg of considerable size three divisions of surface will be found necessary: the posterior and lateral aspects will form one (Fig. 15); the stretching of the peroneal muscles from those of the anterior tibial region, which is done by placing one thumb in advance of the other on each side of the fibula, and alternately rolling the muscles away from each other, will make another (Fig. 16); and for the third the thumbs will be placed upon the tibialis anticus and a simultaneous rolling of the tissues will be made away from the crest of the tibia. In all of these procedures no parts of the hands need be idle, for when not specially occupied, they can be giving secondary attention to the surfaces they cover. Of course, if the limb is small it can all be *masséed* at once in the grasp of the two hands; but even in this case, when special massage is required, these three divisions are necessary. The cushions of the thumbs, the heel of the hand, and the thenar and hypothenar eminences fit admirably into the depressions of the joints, especially those of the ankle, knee, and elbow, while the rest of the hand is occupied with the adjacent tissues. Above the knee one hand will grasp the adductors while the other embraces the quadriceps extensor (Fig. 17), and the alternate contraction and relaxation of the hands will be made in such a way as to stretch

Fig. 10.—Position of hands for the manipulation of front of forearm.

Fig. 11.—Position of hands for the manipulation of back of forearm.

Figs. 12 and 13.—Absurd ways of doing massage, showing how time, space, and effort can be wasted. (From a highly commended text-book on massage.)

FIG. 14.—Manipulation of biceps and triceps; one hand contracts as the other relaxes.

FIG. 15.—Manipulation of leg, especially of the posterior and lateral aspects.

FIG. 16.—Manipulation of the outer aspect of the leg.

FIG. 17.—Manipulation of the adductors and extensors of the thigh.

FIG. 18.—Position of hands for manipulation of the back and sides of the thigh.

FIG. 19.—Manipulation of the hip.

Fig. 20.—Stretching the glutei away from their origin.

Fig. 21.—A good way to begin manipulation on the back of the neck, one hand supporting the forehead while the other works from the spine.

FIG. 22.—Position of hands for alternate friction or manipulation of the back.

FIG. 23.—Adaptation of hands for manipulation of the back.

these two groups of muscles away from the line of the femoral artery. The posterior femoral region may next be gone over, which will principally engage the fingers (Fig. 18), while the upper parts of the hands work upon the sides of the limb; or the patient can turn on the chest and abdomen, when very effectual kneading with the thumbs can be given to the muscles of the back of the thigh. On account of the thickness and tension of the fascia lata the external aspect of the thigh may receive as vigorous kneading as it is possible to give with evenly distributed force, and with the thumbs in advance of each other on the rectus femoris more special and effectual manipulation can be given to the extensors, while the remaining surfaces of the hands make a review of the lateral aspects of the thigh. The hip should be *masséed* from the insertion to the origin of the glutei, from the back of the thigh to the sacro-iliac articulation, and, lastly, the glutei should be simultaneously stretched away from their origin. (See Figs. 19 and 20.) The rate of these manœuvres varies from seventy-five to a hundred and fifty with each hand per minute on the arms, from sixty to ninety on the legs, and from forty to eighty on the thighs, where more force is required on account of the larger size and density of the muscles and the need of using sufficient force to extend beneath the strong, tense fascia lata.

On the back the direction of these efforts will be from the base of the skull downward (Fig. 21), stretching the tissues away from the spinal column while manipulating in graceful curves at an average rate of sixty per minute with each hand. If this be done on one side of the back, as it most frequently has to be, while the patient lies on the other side, it is one of the most difficult manœuvres for beginners to learn, and some never succeed in acquiring it. While both hands are at work on separate spaces occupied by each, the one follows the other, not in an opposite, but in the same circular manner alternately, the one contracting as the other relaxes. The back is most effectually *masséed* with the patient lying on one side, for in this position the ribs and transverse processes form a better substratum than when the patient lies on the chest and abdomen. (Figs. 22 and 23.) On stout patients with firm tissues one hand should often be reënforced by placing the other upon it, and thus massage may be done with all the strength the manipulator can put forth. The position of the shoulder-blades

is important, for if the upper arm be parallel with the side, then the posterior border of the shoulder-blade will be so near the spinal column that scarcely any space will be allowed to work upon the muscles between the scapula and spine. If the upper arm be stretched forward its full length, then the superficial muscles between the spine and the scapula will often be so tense that those beneath cannot be effectually reached by massage. Hence the arm should be placed midway between these two positions. With the ends of the fingers the muscles on each side of the spinal column can be rolled outwards (Fig. 24), and the supra-spinous ligament can be effecutally *masséed* by transverse to-and-fro movements. The ends of the fingers and part of their palmar surface should also be placed on each side of the spinous processes, and the tissues situated between these and the transverse processes worked by up-and-down motions parallel to the spine, taking care to avoid the too frequent error of making pushing, jerky movements in place of smooth, uniform motions in each direction. With the patient lying face down, it is sometimes well to finish off the back by adapting the hands with their whole surface to each side of the spinal column.

On the chest and abdomen the same general direction will be observed as in using friction, but the manipulation will be more gentle than on the back and limbs, for the tissues will not tolerate being so vigorously squeezed and pinched. (Fig. 25.) Here the massage will consist of moderate pressure and movement with the palms of the hands, and rolling and grasping the skin and superficial fascia; and, after this, on the abdomen, firm, deep kneading in the direction of the ascending, transverse, and descending colon, using for this purpose the greatest force with the heel of the hand on the side of the abdomen next the operator, and on the other side the strongest manipulation with the fingers, avoiding the frequent and disagreeable mistake of pressing at the same time on the anterior portions of the pelvis. (Fig. 26.) The sides will incidentally receive sufficient attention while the back, chest, and abdomen are being manipulated. When constipation is obstinate, it is a good plan to commence manipulation of the abdomen over the left venter of the ilium and work so as to push the contents of the descending colon towards the rectum; then begin again a little farther backward on the colon and work in the same direction as before, attempting to unload the large intestine, and so on until

FIG. 24.—Rolling the muscles away from the spine

FIG. 25.—Position of the hands for manipulation of the chest by inward, downward, and outward curves.

FIG. 26.—Manipulation of the abdomen.

FIG. 27.—Grasp for passive flexion and extension or resistive flexion of the hand.

the whole colon is traversed back to the ileo-cæcal valve, and again from there to the sigmoid flexure of the colon.

Except on the muscles of the back, massage by rollers is of little use in comparison with that by hand. They may be made of rubber, wood, or metal, of any size, shape, or color to suit the fancy of the so-called inventor. I have had several sorts and sizes made, and find that tolerably fair and rapid rolling of the muscles of the back may be done by means of a rubber roller three inches in length and an inch and a quarter in diameter secured to a handle like that of a printer's ink-roller. Wooden rollers two inches long and one and a quarter inches in diameter, of a somewhat oval or spindle-shaped construction, made so as to revolve, not only on their own axes, but also on the handles to which they are attached, do very well for the backs of people who are too lazy to take off their clothes.

The wire of either pole of any electric battery or machine can easily be attached to a conducting roller with a non-conducting handle, but the sponges or poles of any battery may be pressed and moved so as to give a kind of massage while the current is passing, and this is much more agreeable and effectual than a current from a metallic roller. Or one pole may be attached to the patient, the other to the manipulator, while the latter does massage with the current passing through both of them. But the so-called "electro-massage" is hardly worthy of the name of massage. Professor Zabludowski used to scorn the idea of doing anything worthy of the name of massage with instruments or machinery, and asserted that only in the hands of physicians would it prove to be an effectual curative means. More recently, however, he sometimes uses instruments for the purpose of giving a rapid rate of percussion for affections of the heart, nerves, etc.

Before leaving this part of the subject the writer begs leave to say something more about the common errors into which manipulators fall, even some of those who pass for being skilful. Many do not know how to do the kneading or malaxation with ease and comfort to themselves and to their patients, for in place of working from their wrists and concentrating their energy in the muscles of their hands and forearms, they vigorously fix the muscles of their upper arms and shoulders, thus not only moving their own frame with every manipulation, but also that of their patients, giving to the latter a motion and sensation as if they were at sea in stormy

weather. By this display of awkward and unnecessary energy not only do they soon tire themselves out and fancy that they have lost magnetism by imparting it to their patients, but by the too firm compression of the patient's tissues they are not allowed to glide over each other, and hence such a way of proceeding entirely fails of the object for which it is intended. Surely, cultivation is the economy of effort, and the most perfect art consists in acting so naturally that it does not appear to be any attempt at art at all. The following words of J. Milner Fothergill are here applicable: "The knowledge which one man acquires by the sweat of his brow after years of patient toil and painstaking cannot be transferred in its entirety to another. Individual acquired skill cannot be passed from brain to brain, any more than the juggler who can keep six balls in the air can endow an on-looker with like capacity by merely showing him how it is done. The muscles, and still more their representatives in the motor area of the brain hemispheres, require a long training before this manual skill can be acquired."

Friction and manipulation can be used alternately, varied with rapid pinching of the skin and deeper grasping of the subcutaneous cellular tissue and muscular masses, and when necessary with percussion, passive, assistive, or resistive movements, finishing one convenient surface or limb before passing to another, and occupying from half an hour to an hour with all or part of these precedures. Pinching is rather an agreeable way of exciting the circulation and innervation of an inert skin, and for this purpose it is best done rapidly at the rate of one hundred to one hundred and twenty-five per minute with each hand. The grasp of a fold of skin should not be relaxed until seized by the finger and thumb of the other hand. To act upon the subcutaneous cellular tissue, a handful of skin is grasped and rolled and stretched more slowly than by the preceding method. A deeper, momentary grasping of the muscles is often advantageous, and may be called a *mobile intermittent compression,* and this, indeed, is what the whole of massage strictly speaking consists of.

Percussion, in general only applicable over muscular masses, may be done in various ways. In the relative order of their importance they are as follows: 1. With the ulnar borders of the hands and fingers. 2. The same as the first, but with the fingers separated so that their adjacent sides will strike against each other

like a row of ivory balls. 3. With the ends of the fingers, the tips being united on the same plane. 4. With the dorsum of the upper halves of the fingers loosely flexed. 5. With the palms of the hands. 6. With the ulnar borders of the hands lightly shut. 7. With the palms of the hands held in a concave manner, so as to compress the air while percussing. The back of a brush or the sole of a slipper sometimes answers very well for percussion; but still better are India-rubber air-balls secured to steel or whalebone handles. With these, one gets the spring of the handles together with the rebound of the balls, and thus rapidity of motion with easily varying intensity may be gained, if the operator know how to let his wrists play freely, as he should do in all the different ways of percussing. The number of blows may vary from two hundred and fifty to six hundred with both hands. The blows should be smart, quick, and springy, not solid and hard, and they should be transversely to the course of the muscles with the ulnar border of the hand and palmar surface; except in the case of the back, which may not only be percussed with the hands at right angles to it while the patient is lying, but still more effectually when the patient is standing bent forward, so as to put the dorsal muscles on the stretch. The operator's hands are then most easily parallel to the spine, and can rapidly strike the muscles on each side of it, causing, we have reason to suppose, a vibratory effect, as when the string of a bow is vibrated. Moreover, in this position the muscles, being tense, protect the transverse processes from the impact of the blows which is communicated to the nerves as they emerge from the intervertebral foramina, and the effect is usually perceived to their distributions all over the body as a peculiar and delightful thrill. Percussion must be carefully used, or it will leave the muscles lame and sore.

Remedial movements have been more fully than clearly described in books on "Movement Cure." A comparison of different ways of executing them demonstrates that the part of the limb or body taken hold of for leverage, and the manner of seizing the same, the direction of resistance and force opposed, are all of importance in order that the movements may be done easily, efficaciously, and harmoniously. Those who would apply them should know the anatomy and physiology of the joints and their natural limits of motion. Except in the case of relaxed joints, passive motion should be pushed until there is a feeling of slight resistance

to both patient and manipulator; for by this it will be known that in healthy joints the ligaments, capsules, and attachments of the muscles and fasciæ are being acted upon. Resistive movements are such as the patient can make while the operator resists, or such as the operator overcomes when the patient resists, as when a group of muscles is voluntarily contracted, the operator extends them. The former have been called double concentric movements, and the latter double eccentric. It seems to me that the author of these terms must have been somewhat eccentric, for even such a good writer as Estradère pardonably confounds their meaning, as can be seen by comparing his explanation of them on page 72 with that on page 80 of his book on "Massage." Brown-Séquard first pointed out the fact to me that when it is desirable to exercise a group of very much enfeebled muscles, if they be first contracted to their utmost, it will require much greater force to overcome this contraction than they could overcome in passing from a state of relaxation to contraction, and I have since proved the practical value of this suggestion. Most frequently, however, it will be necessary to offer resistance against the patient's movements, and then the opposing force should be carefully and instinctively kept within the limits of the patient's strength, so that he may not recognize any weakness; and this, with all these other manœuvres, should stop short of fatigue, at least fatigue that is not soon recovered from. To alternately resist flexion and extension is the *pons asinorum* of manipulators, and in a considerable experience of teaching massage I have found but few who could learn to do it well, and many who could not learn to do it at all. Many a patient who has recovered from an old injury is still as much incapacitated as ever from the fact that his latent energies can only be discovered and made available in this manner. Midway between passive and resistive movements, in the course of certain recoveries, stand assistive movements. They are but little understood and seldom used. Let it be supposed that, in the absence of adhesions and irreparable injury of the nerve-centres, the deltoid has but half the requisite strength to raise the arm. So far as any use is concerned, this is the same as if there were no power of contraction left in the muscle. But if only the other half of the impaired vigor be supplemented by the carefully graduated assistance of the operator, the required movement will take place; and in some cases, if this be regularly per-

sisted in, together with manipulation and percussion, more vigorous contraction will be gained, and, by-and-by, the patient will exert three-fourths of the necessary strength, and later the whole movement will be done without aid, and, as strength increases, resistance can be opposed to the movement. The importance of these measures can hardly be over-estimated in cultivating the strength of weakened muscles, while at the same time finding out how much they can be used. Still another kind of movement may be spoken of—namely, vigorous passive motion—with a view to breaking up adhesions in and about joints. It is the secret of success and of failure of the people who call themselves "bone-setters," the methods of whom have been well studied and explained by Dr. Wharton P. Hood, of London, in his highly entertaining book, "On Bone-Setting, So-Called."

So much for a general outline of movements. Let us speak of them more in detail. In doing a resistive movement in which the patient is the prime mover, the *masseur* waits till he finds the movement begun, then gradually increases the resistance to the utmost within the limits of the patient's strength, and finally slacks up more slowly. This must be practised by the manipulator on well people until he can instinctively judge of the patient's strength and make elastic resistance. The resistance must be in line with the patient's movements, and the grasp of the operator must not be so firm as to interfere with his own sensation or that of the patient. It will often be found that the patient uses nearly all his strength in contracting his muscles, and scarcely any in overcoming the resistance, in which event it will be necessary to tell him to move more quickly and not try so hard. Here physiology steps in and gives us a reason for the faith that is in us, showing how science agrees with art. Muscular contraction presents three phases: 1. A preparatory or latent period during which there is no visible movement when the nerve and muscle are getting ready to act. 2. A phase of shortening or contraction. 3. That of relaxation or return to its former length. In harmony with these phenomena, and with the manner of doing each and all of the manipulations, and especially resistive movements, physiology teaches us that at the close of the latent period the muscle shortens in each fibre, at first slowly, then more rapidly, and lastly more slowly again. In accordance with these physiological principles

of muscular contraction, it would be difficult to conceive of anything that would make graduated and harmonious resistance, save human power guided by human intelligence. Springs and elastic contrivances come nearest to it and do very well on starting, but the longer the pull or push the stronger becomes the opposition, and there is no third stage of lessened resistance.

The manner of taking the hand to give it passive motion of flexion and extension and to resist flexion is the same. Let the patient's forearm be midway between pronation and supination, and then seize the hand as if about to shake hands, the right hand for the right hand of patient, or the left for the left, so as to bring the resistance on a line with the metacarpo-phalangeal joints, which affords the best leverage for both patient and operator; the other hand at the same time will support and make counter-resistance on the back of the arm about one inch above the wrist. (Fig. 27.) To resist extension of the hand, the patient's forearm should be pronated, then the operator will take the hand in such a way as to bring the resistance over the heads of the metacarpal bones, his right hand for the patient's left, and the left for the right, while the other supports and steadies the arm above the wrist on the anterior surface. (Fig. 28.) For passive pronation and resistive supination the manner of holding the arm is the same; the operator's right hand seizes the left wrist and lower ends of the radius and ulna of the patient so that the metacarpo-phalangeal joint of his thumb is upon and behind the styloid process of the radius, the point of resistance, care being taken not to squeeze so tightly as to prevent these bones from rotating upon each other; in the mean time the other hand of the operator gently supports the arm of the patient. (Fig. 29.) For passive supination or resistive pronation the same grasp suffices, with the right hand of the manipulator for the right arm of the patient, or the left for the left, which seizes the wrist and lower ends of the radius and ulna so that the metacarpo-phalangeal joint of the thumb is anterior to the styloid process of the radius, the same care being observed not to hinder the motion by holding too tightly, while the arm of the patient rests in the other hand of the operator. (Fig. 30.) For passive or resistive motion of the forearm the right wrist of the patient is gently held by the right hand of the operator, while the left hand steadies the arm just above the condyles of the humerus, and the same grasp

FIG. 28.—Resisting extension of the hand.

FIG. 29.—Grasp for passive pronation or resistive supination.

FIG. 30.—Passive supination or resistive pronation.

FIG. 31.—Passive or resistive flexion and extension of the forearm, or circumduction of the forearm.

suffices for the passive combined motion of flexion, extension, pronation and supination, abduction and adduction, together with rotation of the humerus, all of these seven last movements being accomplished at one and the same time by simply making the wrist describe a circle. (Fig. 31.) Circumduction of the humerus is most easily and effectually done by standing behind the patient, and while fixing the right shoulder with the left hand, or the left with the right, the other hand takes the arm just below the elbow and makes this traverse as great a circle as moderate resistance will allow, the operator remembering that the greatest resistance will be at the upper and outer third of the circle, owing to the natural formation of the joint. The same hold and support answer well for resisting a forward motion of the upper arm. If the patient be lying on the right side, or the operator be standing in front of the patient while the latter is sitting, tolerably good circumduction may be done by taking the left wrist in the left hand and placing the right hand upon the elbow. But this is not so effectual as the first method, owing to the great mobility of the scapula. Backward motion of the humerus can be steadily and definitely resisted by taking the right hand of the patient in the right hand of the operator, or the left with the left, while the other is placed at the back of the forearm, not to pull, but only to steady the movement. The action of the deltoid in elevating the arm can be well resisted by steadying the shoulder with one hand while the other is placed on the outside of the upper arm, and the opposition can easily be increased by moving the hand towards the elbow, or diminished by moving the hand towards the shoulder, the operator meanwhile standing behind the patient. Standing in the same position with the inner condyle of the humerus in the middle of the palm, the *masseur* can resist downward motion of the patient's upper arm, a most admirable procedure to tire the muscles when we have to deal with a weak deltoid. When it is desired to limit motion to one joint, it will be observed that the proximal side should be steadied while the distal side is moved, and nowhere is this more disregarded than with the fingers.

For passive or resistive motion of the ankle-joint the best way of taking hold is not by seizing the heel with one hand while the other surmounts the toes, as is generally done, but with the right hand for the right foot, or the left hand for the left foot, by grasp-

ing the metatarso-phalangeal joints at right angles while the other hand supports the leg above the ankle. (Fig. 32.) For this purpose the operator should sit facing the patient and be careful that his active arm is in a straight line with the patient's movement. This affords the best leverage for flexion and extension of the foot, as well as for a circumductory motion, by making the place of seizure describe a circle, the outer half of which will offer the greatest resistance, owing to the large internal lateral ligament and the stronger structures on the inside of the joint. The same hold answers for resisting flexion and extension of the foot. When this is done alternately, in the interval of change, here and elsewhere, the hand of the operator must alter its position slightly so as to present a proper surface for resistance. In the case of the foot and forearm, the fingers will pull and resist flexion, and the heel of the hand will push against extension. On the foot the tendency is to make resistance too near the toes; opposite the heads of the metatarsal bones on the back and sole are the points that afford the best and most natural leverage. By seizing the heel and holding the ball of the foot as just described for passive motion, a twisting motion can be given to the whole foot which acts more decidedly on the tarsal and metatarsal articulations. Flexion and extension of the leg at the knee, either passively or resistively, are seldom necessary to be done alone (except for some special reason), as they are accomplished so much better together with flexion and extension of the thigh; and for this purpose the right heel of the patient is taken in the palm of the right hand of the operator, or the left in the left, while the other hand holds the calf, and a steady uniform push is made, the limb, by its own resiliency, usually returning to a state of extension. Circumduction of the thigh will be performed by simply changing the hand that holds the calf on to the top of the knee, which affords excellent and easy leverage. On each side of the forefinger of the hand that manages the heel the covering will be held by the thumb and middle finger, so that the patient may not be fanned into the next world. Opposing flexion and extension of the leg and thigh may be done by holding the leg and foot as for passive or resistive movements of the ankle, and if the couch on which the patient lies be low, the manipulator will often require to rest on the knee next the patient on the floor, and in resisting extension will throw the weight of his body in part or

FIG. 32.—Grasp for passive or resistive flexion and extension, or circumduction of foot.

FIG. 33.—A good way of resisting flexion and extension of leg and thigh

wholly against the extending limb; and in doing this the arm must not be extended but flexed, so as to bring the hand as near as possible to the shoulder in order that the resistance may be strong and steady by having the weight of the body added to it (Fig. 33); or he can stand with his back to the patient and clasp his hands on the sole of the arch to resist extension. Resisting extension of leg or thigh is hard for the manipulator, easy for the patient. On the other hand, resisting flexion of the leg and thigh is easy for the *masseur,* hard for the patient, and both should remember that these must not degenerate into play in order to see which is the stronger. Six to a dozen carefully graduated pushes and pulls in each direction, either successively or alternately, may be done. Opposing abduction and adduction of the thighs scarcely needs mention, so simply are they done by alternately placing the hands on the outer and inner aspects of the semi-flexed knees; and to resist the contraction of the psoas magnus and iliacus internus alone, resistance may be made to the flexing thigh on any part of its anterior aspect.

Passive stretching of the arms and shoulders, of the pectoral muscles and latissimus dorsi, can be done agreeably and effectually while the patient lies squarely on the back, the head and shoulders being slightly elevated on an inclined plane. The arms of the patient are extended upward on a line with the body, and the manipulator, standing behind, holding the hands, makes a gentle, elastic, and vigorous pull; and if the feet be held, a stretch of the trunk and lower limbs can also be obtained.

The manner of seizing the hands of the patient for this purpose is worthy of particular notice. They are grasped so that their palmar surfaces obliquely cross the palmar surfaces of the operator, the fingers of the manipulator surround the metacarpal region of the thumb, while the thumb of the operator passes between the thumb and index finger of the patient, and the heel of the hand rests securely upon the metacarpal region of the patient's little finger, so that the hands of the patient and manipulator are complementary to each other. This is a puzzle for most people to do, even after having seen it done. The same hold suffices for resisting a downward pull of the arms, which brings the aforesaid muscles more strongly into play, elevates the chest, and deepens inspiration. With the patient sitting slightly inclined forward, the hands clasped at the back of the head, the oblique and transverse

muscles of the abdomen can be passively exercised by seizing the patient at or near the shoulder-joints and rotating the body, the manipulator, of course, standing behind the patient. The same position of the patient does well to make these muscles act more vigorously by opposing their voluntary contraction. In doing this the *masseur* stands behind and to one side of the patient, steadying the body of the latter with the left hand upon the left shoulder or the right upon the right, at the same time that the other hand holds the humerus near the elbow, by which great leverage is obtained in resisting rotation of the trunk. At first the patient will naturally err in limiting the motion to the arms and chest, but he can be gradually educated to lessen this and increase the rotation at the waist. Upon a vigorous and healthy tone of the muscles of the abdomen depends to a large extent the welfare of the organs situated beneath them, and no muscles are so much "left out in the cold" for want of exercise as these. Gentle rowing exercise for the muscles of the back can be given to invalids by standing in front of them and taking hold of the hands; but for this purpose elastic cords or straps answer well, as the weight of the body makes the pull strongest at its termination. Other movements, passive and resistive, may be devised to meet the indication of individual cases, and, of course, it will not be forgotten that active or voluntary movements may be turned to good account—with special modifications—as remedial agents.

Gymnastics and calisthenics do not belong to a description of massage. In accordance with the principles here laid down for doing massage and resistive movements, we find but one plate in Schreiber on "Massage" at page 5, and that is borrowed from the accomplished oculist Pagenstecher, of Wiesbaden. All the other plates show more or less disregard for economizing time, space, effort, and the comfort of the patient, the most remarkable being on page 48, where the patient has to hold on to the chair upon which he sits and fixes all the muscles of both arms, chest, and trunk for the simple purpose of flexing his right arm against resistance. If he were driving a runaway horse and in danger of being thrown from his seat, he could scarcely be better represented. In Laisné on "Massage" there is but one plate, at page 110, that at all agrees with the mode of proceeding I have described, and in this but one-half as much of the hand is occupied as might be; while his most

striking disregard for common sense appears in plate 5 on page 48, where one hand is placed in the popliteal space, thus hindering the very movement the other is trying to make—namely, flexion of the leg. Between these two extremes, represented by Schreiber, Laisné, and others, all sorts of anomalies occur, so that we may fairly conclude that massage and remedial movements are usually done "every which and t'other way" in hopes of hitting upon a right way, but from what has been said in this chapter we have a right to expect and require a tolerable degree of precision.

Cures by massage are not sinecures, but the task of applying it is rendered much greater than is necessary from the crude notions that prevail on the subject, and even Dr. Weiss, of Vienna, recommends the physician to drink a glass of good old wine every fifteen minutes if he himself undertake such arduous work.* This, if furnished at the patient's expense, might sometimes be an inducement that would prolong the treatment unnecessarily. But such suggestions proceed from the same misconceptions of massage as require the removal of hair and the constant use of grease, and those who cannot do massage without them certainly cannot do anything worthy of the name with them. People of education, refinement, and delicacy of touch can do massage a great deal better than those who rely upon the unguided strength of muscle alone.

Can one do massage on one's self? Not very well, for action and reaction being equal and opposite, it is somewhat like trying to pull one's self over a fence by the straps of one's boots. Moreover, if not accustomed to doing massage, one can easily ascertain the difficulty of doing this effectually and gracefully by comparing the effort with his first attempts at writing or brushing the teeth with his left hand. A young surgeon of my acquaintance undertook to *masser* his father, a surgeon of eminence. It did not take him long to rub the skin off his father's neck. In quality and endurance the strength necessary for doing massage is different from that required to scrub a floor, swing a sledge-hammer, or win a boat-race. There is as much difference in massage and manipulators as there is in music and musicians, or in people in other occupations. It may be said that *savoir faire*, gumption, and rule-of-thumb all go towards making a manipulator skilful. But he

* Wiener Klinik, page 335, 1879.

will doubtless at times attain his best by forgetting art and aiming beyond it in his sincere desire to do good. And this will be an instance that often "it is the heart and not the brain that to the highest doth attain," but not the one without the other. "All great art is the expression of man's delight in the work of God," but with this it should be remembered that those who are best able to resolve will be best able to combine.

Unless the patient come to the office of the *masseur* it is better that the latter should ride to the patient, in order that his pulse and respiration be not quickened. For even an acceleration of these, which is very agreeable in the open air, will make it very uncomfortable for the *masseur* to work in a closed room; and from this oftentimes has arisen the fallacy that he has lost vitality by imparting "magnetism" to his patient. After the *séance,* being slightly heated, he will find it easy, agreeable, and salutary to walk, especially before meal time, when the products of digestion are being poured into the circulation in greatest abundance.

IV.

Physiological Effects of Massage.

"This is an art which does mend nature,
But the art itself is nature."

THAT massage has been steadily gaining in favor with the medical profession and the public for the past twenty years can hardly be denied, even though its performance has usually been left in the hands of the most common and uncommon people, to whom it is intrusted as a matter of favor, friendship, or charity, without regard to their qualities or qualifications. It is a mystery yet to be explained why patients who are proof against the most time-honored remedies and defy the most painstaking skill should be consigned to such hands, as if they were endowed with supernatural virtues. Contrary to the advice of physicians, however, many patients not infrequently prefer to fall into such hands, and by so doing put a premium on ignorance. Benefit or harm may follow from the roughest kind of scraping and pounding, and in a matter of such great importance as recovery from chronic and often hitherto regarded as hopeless invalidism, the means employed cannot be too carefully selected, especially when it is a question of such a potent agent as massage, which affects, either directly or indirectly, every function of the human body.

THE INFLUENCE OF MASSAGE UPON THE SKIN.

A study of the effects of massage on the healthy body is commensurate with that of physiology itself, and only a general outline of them can here be attempted. The pressure of deep massage exerts a simultaneous influence upon all the tissues within its reach, upon the skin, fasciæ, muscles, vessels, nerves, etc. The skin, by reason of its highly organized structure, is remarkably well adapted for receiving and transmitting the influence of massage. Beginning at its exterior, we find that the epidermis not only limits watery evaporation, prevents the absorption of noxious substances, and diminishes the evolution of heat, but it also serves as a protection to the papillary layer against the encroachment of

too vigorous friction or other external violence. The highly sensitive and vascular papillæ on which the deeper layer of the cuticle fits so accurately gratefully respond in agreeable sensation to judicious friction and manipulation, or unhesitatingly complain when the skin is pinched too strongly, or when the cuticle has suffered abrasion. With a deeper and a more superficial plexus of nerves whose terminal filaments carry along and register so well any morbid action at their origin in the central nervous system, it has been reasonably inferred that appropriate stimuli applied to them, such as massage and electricity, often exert a favorable and curative influence upon disturbances at their other ends in the brain and spinal cord. The soothing effect of gentle stroking transmitted to the sensorium is well known; but it is not so generally recognized that pinching the skin produces an analgesic effect upon it, even to the extent of inserting a hypodermic needle without the prick being felt. The principal seat of the sense of touch, there is perhaps no sensation that can be felt by the skin so delightful as that arising from the contact of the hands in properly done massage, or none so disagreeable as that from improperly applied massage.* Tough, flexible, and elastic as the skin naturally is, owing to the white fibrous and yellow elastic tissue in its composition, it is rendered none the less so by a prolonged course of massage. On the contrary, while it becomes softer, suppler, and finer under manipulation, it at the same time becomes more tough, flexible, and elastic, so that whereas at first, in many cases, it could scarcely be gently pinched and grasped without hurting, later on the patients will often delight in almost being lifted up by the skin, like one of the agile domestic animals. With the capillary blood-vessels nearer the surface than the lymphatics, the effect of massage would naturally be greater on the former than on the latter, and thus would be verified the remark of old Celsus, "that the food penetrates to the skin, which has been relaxed by a kind of

* Herbert Spencer has pointed out that the senses of smell, hearing, sound, and taste may have sprung by evolution from the sense of touch. Touch is the universal language into which the other senses have to be translated. The deaf, dumb, and blind appreciate the different qualities of music by means of the vibrations when brought in contact with the instruments that produce them. Thus Helen Keller, who is at present taking the course at Radcliffe College, astonished the audience by swaying her body and giving vocal expression of delight as she leaned her arm on the piano while a distinguished pianist played.

digestion or removal of its tissue." Insensible perspiration, when deficient, is increased, and the sebaceous excretion is facilitated, as is best shown by the moisture and gloss of the hair after massage of the head. Weynrich has shown that by the mechanical action of friction the excretion of water through the skin can be increased sixty per cent. or more. For rousing the action of languid skin alone, friction, pinching, and percussion would commend themselves. The frequent effect of massage upon the skin and expression of countenance remote from its seat of application was well shown in a gentleman fifty years of age, of swarthy complexion, upon whom the marks of time were apparent in moderate wrinkles on his countenance, who, after a four months' course of massage for a peculiar affection of the muscles of his back, looked very much younger; his skin was clearer and smoother. One morning I said to him, "You look ten years younger, sir." He stared at me in astonishment and replied, "You are the third person who has told me that within twenty-four hours." This is one of the incidental effects of massage which is simply an expression of renewed vigor and improved general health.

In malnutrition from digestive, respiratory, and other disturbances inunction has often proved an efficient means of furnishing nourishment to the system when other means have failed. The skin is in the best condition for absorbing oils towards the end of a *séance* of massage when its circulation has been thoroughly aroused, and for this purpose a preliminary warm bath is of great aid.

The normal function of the superficial fascia in facilitating the movement of the skin over the subjacent structures is favorably influenced by massage, especially when there exists a tough, *matted, hide-bound* condition; and this, if looked for, will be found as often in the human race as in the equine, indicating that there is neither swiftness of motion nor clearness and vigor of thought. Its diagnosis and removal are accomplished by the same means, and the superficial vessels and nerves that pass through this fascia, besides being acted upon directly, are at the same time freed from the hinderance of pressure. Grasping a convenient portion of skin and slowly moving and stretching it effects this object most easily.

THE EFFECTS OF MASSAGE UPON THE MUSCLES.

To aid and imitate the natural functions of the human body is often the chief aim of the physician, and, in doing this, he may constitute himself an artist of the highest order, and few, if any, remedial agents can he call to his assistance that will so exactly reproduce the mechanical forces that carry on nutrition as massage. In attempting a description of the effects of massage upon the muscles and deep fascia, and, indeed, upon all the other tissues, it would be desirable that the mirror should be held up to nature as perfectly as it ever has been in any work of art, and doubtless the future developments of physiology will add much to the lights and shadows of this picture and remove from it a great deal of the mysterious and unhallowed mist that has so long obscured it; for I am sure that no more fertile field awaits the investigations of physiologists than that of ascertaining the similarities and differences existing between massage and exercise. No better meed of praise could be bestowed upon any therapeutical agent whatsover than the old-fashioned, haughty, supercilious way of dismissing the subject of massage as unworthy of notice by saying that it was merely a substitute for exercise, and that it acted upon the mind of the patient. According to this way of reasoning, if one were deprived of air, a substitute for it, if it could be obtained, would be of no account. Appropriate exercise acts and reacts favorably upon mind and body, upon nerves and muscles, and people who can exercise freely without fatigue and who can eat and sleep well seldom need massage.

A study of the natural functions of the human body alone might teach us to use massage when they are in a state of suspension, abeyance, or morbid action. By their intermittent compression and relaxation, muscles in action exert a sort of massage upon each other. The ascent and descent of the diaphragm in respiration make continual massage and passive motion upon the organs above and below it, more especially upon the abdominal and pelvic organs; and when its movements are limited from want of exercise, or restrained by tight lacing, it is only too familiar how feeble become appetite and digestion, and how constipated the bowels get. The voluntary muscles should weigh about one-half the weight of the body, and receive about one-fourth of the

total amount of blood in the body, and few organs are as plentifully supplied; and their vessels may with propriety be considered as the derivative channels for the relief of hyperæmic conditions of internal organs. Their action presents a great similarity to that of a beating heart, for at every contraction of a muscle the blood is driven out of it, and by this it at the same time receives an additional impulse in its return to the heart, while at every relaxation the vessels are again allowed to fill. The parallel may be carried still further in order to point out a practical lesson; for the heart, which is abundantly supplied with blood for its own nourishment, lasts a lifetime usually without fatigue, though in constant activity, while voluntary muscles, if allowed to remain inactive, soon suffer in size and strength, for their "circulation goes around rather than through them," as so aptly expressed by Dr. S. Weir Mitchell. Hence the importance of some measure that will overcome the evils of inactivity, that will at once attract the circulation to the muscles and at the same time aid in its return. This indication is, perhaps, better fulfilled by the intermittent pressure of massage than by any other known remedy; for it makes more blood go through the skin and muscles, and consequently less to the brain, spinal cord, and internal organs generally. Not that the effects of massage and exercise are alike in all respects, and that massage is only a substitute for exercise, as some would have it, for voluntary exercise means exercise of the nervous system quite as much as of the muscular, and sometimes more; besides, the cases that are often much benefited by massage are those of overtaxed brain and used-up nervous energy, in whom exercise, in the ordinary sense, would only increase exhaustion and which yet require a mechanical stimulus of their nutritive functions. True, a certain store of latent energy is necessary in order to undergo massage, but this is much less than would be required for voluntary exercise, were this possible. Fatigue is an indication that waste is greater than repair. Muscular fatigue from over-exertion or want of exercise is relieved by massage, which promotes a more rapid absorption of waste products and stimulates the tardy peripheral circulation upon which weariness to a large extent depends, thus showing a marked difference between the effects of exercise and those of massage. Fatigue from mental straining is relieved by the same means which increases the area and quantity of the cir-

culation in the external tissues of the body, and thus depletes the over-filled cerebral vessels.

In this connection the observations of Dr. Zabludowski, professor of massage in the University of Berlin, on the effects of massage upon healthy people are of great importance and significance.* They were made in November, 1881, upon himself, then thirty years of age; upon his servant, twenty years of age; and upon his housekeeper, forty-seven years of age. All three were living under the same conditions with regard to food, activity, and dwelling, and for eight days prior to their massage, examinations were carefully made of their weights, muscular strength, temperature, pulse, respiration, and urine. Observations were made during the ten days in which they had general massage, and also for eight days afterwards. The muscular strength of all three increased during massage. The weight of the one who was tolerably corpulent decreased, as also did that of the slender housekeeper, and, corresponding to this, there was an increased excretion of urates and phosphates. The weight of the one who was but moderately nourished increased, and with this there was found a diminution of urates and an increase of sulphates in the urine. The massage of the abdomen excited the large intestine to powerful peristaltic action and caused regular evacuations. Oft-repeated observations showed that there was an elevation of the functions of life in general, and, with the improved frame of mind, there was also easier movements of the body. Appetite increased and sleep was soft, gentle, and steady. The effects of the massage disappeared soonest from the moderately nourished person, the servant; and they lasted during the whole time of observation, for eight days after the massage, upon the housekeeper, who, though thin and slender, had lost weight, while upon himself, the moderately corpulent person, the after-effects varied at different times.

Interesting observations have been made by Dr. Hopadzë showing the influence of massage on the metamorphosis and assimilation of nitrogenous food substances. He daily estimated the nitrogen of the food, fæces, and urine for one week before, during one week of massage, and for a week after, and found that the nitrogenous metamorphosis in all four persons to whom he gave daily massage

* Zabludowski über die physiologische Bedeutung der Massage. Centralblatt für die Med. Wissenschaften, April 7, 1883.

of twenty-five minutes invariably increased and lasted for seven days after the week of massage. The assimilation of the nitrogenous substances of the food increased in all the cases and lasted during the week after massage. All the four patients increased in weight during the week following the massage; but during the week of massage one gained in weight, two lost, and one was unchanged. It is possible that these changes lasted longer than seven days after the massage, but the observations were not continued beyond this time. Another series of observations by Hopadzë showed that massage of the abdomen for ten minutes lessened the sojourn of the food in the stomach from fifteen to seventy-five minutes.

Salol serves a useful purpose in showing to us when the contents of the stomach pass into the small intestine. Insoluble in the gastric juice, it is decomposed into its two constituents in the small intestine, where it is subjected to the action of the contents of the duodenum, which render it soluble and easy of absorption. Soon after absorption into the circulation it is found in the urine as salicyluric acid and sulphocarbolic acid, its presence being shown by the production of a red-violet precipitate when the urine, after acidulation with hydrochloric acid and shaking with ether, is tested with a solution of perchloride of iron. The experiments of Professor Ewald and Dr. Eccles agree in that they found in most cases under natural conditions without massage that salol could be detected in the urine in forty-five minutes after its administration, but after massage to the abdomen for fifteen minutes the reaction of salol was obtained in the urine in thirty minutes. In two obstinate cases the addition of general massage had a more favorable effect in hastening the absorption of salol than did massage of the abdomen alone. Acute catarrhal conditions and chronic dilatation delays the decomposition and absorption of salol.

After the administration of one gramme of salol to people suffering from chronic dyspepsia, Hirschburg, Brunner, and Huber found that it required from two hours to two and a half hours before the reaction of salol could be detected in the urine. After a walk of fifteen minutes or gymnastic exercises for ten minutes the reaction was obtained in one hour and five minutes. Similar results were obtained from faradization, but massage proved more efficacious than any other means in hastening the passage of salol from the stomach to the duodenum.

Zabludowski has also made some interesting experiments to learn how fatigued muscles are influenced by massage. Muscles of uninjured frogs were exhausted by a series of rhythmic contractions caused by an induction current. Under massage they soon regained their lost vigor, so that the contractions were almost equal to the first, whilst a rest for the same period without massage had no effect. These experiments, showing the restorative effects of massage upon wearied muscles, were more than confirmed in man by the same investigator. He found that after severe exercise a rest of fifteen minutes brought about no essential recovery, whilst after massage for the same period the exercise was more than doubled. One person experimented upon lifted a weight of one kilo (2.2 pounds) eight hundred and forty times, at intervals of one second, by extreme flexion of the elbow-joint, from a table upon which the forearm rested horizontally, and after this he could do no more. When the arm had been *masséed* for five minutes, he lifted the weight more than eleven hundred times in the same manner as before without fatigue. The difference in muscular sensation was very striking after rest alone from work, in comparison with that after massage. In this case the person experimented upon was an expert subject for experiment, and after he had made six hundred lifts of two kilos (probably in the same manner as that just referred to), there was unvarying stiffness during a pause of five minutes for rest; but after five minutes' massage the muscles felt supple and pliant.

Of the influence of massage on reflex irritability Zabludowski found by a series of observations on rabbits that sensibility was lessened whilst the reflex action of the spinal cord remained without change.

Later observations also showed him that when rabbit-muscle had been tetanized by means of an induction current, the motility of the muscle was only imperfectly and transitorily restored after ten minutes of rest, so that they could be very easily again thrown into a tetanic condition. But when, in place of rest, ten minutes of massage was used, the power of motion of the muscles became four or five times longer than before.

By an exceedingly interesting and accurate series of experiments Professor Maggiora, of the University of Turin, has shown the restorative effects of massage upon his own muscles when weak-

ened by physical or mental labor, by electricity, by hunger, loss of sleep, and slight fever. For this purpose the fatigue curves of the right and left middle fingers in maximum voluntary flexion were taken every two seconds with a weight of three kilogrammes. The average results showed that the muscles concerned in this movement could do about twice as much work after a few minutes of massage as they could without. When, however, the brachial artery was compressed and the blood supply shut off massage had no effect at all. Of the three principal forms of massage, he found that friction and percussion were much alike in the restorative effects produced by each, while *pétrissage* or kneading had a much greater influence than either of the others. When all three were used the greatest effect resulted. As to the effects gained by the length of time the massage was used, he found that five minutes applied to the middle finger and forearm brought forth a greater capability of work than when applied for a longer or shorter time.* I have always maintained that manipulation, kneading, or *pétrissage* are of more value than all the other procedures of massage put together.

Kroneker and Stirling have shown that muscles, when fatigued, can be tetanized by much less frequent irritation than when fresh and rested. A fresh muscle that receives six irritations per second passes gradually from its intermittent contraction into that of tetanic contraction. Later, upon fatigue, this will be less. If the muscles are allowed to recover by rest alone for a short time, upon renewed irritation they very soon pass into a tetanic condition. If, however, during the same pause for rest the muscles have been *masséed*, then their motility returns, so that they have the power of contracting a great many times, often one hundred. According to this, massage is considered by these observers to act as a perfect *perfusion*, bringing nourishment to the muscles and thoroughly removing asphyxiated juices from them. It was found that the sensitive nerves of the skin lost considerable of their irritability during massage; but over-irritation, in consequence of strong rubbing, might sometimes be made available.

My own observations, repeated almost daily, teach me that muscles give a much more ready, vigorous, and agreeable response to the will, to the faradic and galvanic currents, after massage than

* Archives Italiene de Biologie, Tome XVI., fasc. ii.-iii.

they do before, especially if they are somewhat deficient in contractility. But in my cases the trouble is not taken to fatigue the muscles by electrical stimuli before massage, but only to test them briefly. We may therefore conclude that massage lessens irritability, but increases power of action.

THE INFLUENCE OF MASSAGE UPON THE CIRCULATION.

Evidence in favor of free circulation would be almost as superfluous as was Sancho Panza's apostrophe to sleep. Running water frees itself from impurities to a great extent, and unimpeded circulation may well be likened to a running stream, doing useful work and keeping the machinery of the various districts of the body in motion and in health. A rapid flow, whether in a river, blood-vessel, or lymphatic, prevents the deposit of particles held in suspension. In an interesting article on the "Influence of Rest and Motion as the Phenomena of Life" (*Archiv für die Gesammte Physiologie,* Vol. XVII., page 125), by Dr. Horvath, of Kieff, we are told that it was with the greatest astonishment that the observer saw that the direct introduction of bacteria into the arteries, instead of increasing or calling forth disease, on the contrary produced no observable indisposition in the animals so treated. Indeed, the bacteria disappeared to such an extent that they could not be found in the blood of the vessels where they had been injected in the greatest abundance. Animals that die from bacteria poisoning have the bacteria for the most part in the lymphatics, never in the large arteries, where we might expect to find them, for it is here they get the oxygen requisite for their development, present in greater abundance than in the veins and lymphatics.

For further evidence of free circulation overcoming the influence of noxious substances, we have only to recall the fact that laborers will work in an open sewer with impunity, while business or professional men in their offices near by would be made sick if they should leave their windows open. Let the circumstances be reversed, and those in active exercise would be less likely to suffer than the sedentary laborers. It has been estimated that a person in exercise consumes four or five times as much oxygen as he does when at rest, but in the case of one working in a sewer, the air is so vitiated that we must conclude that it is not the oxygen, but the exercise and the active circulation that keep off the

bad effects of the effluvia. Even local stagnation of the blood from injury or other cause may lead to pathological changes resulting in death or requiring the amputation of a limb.

It is, indeed, a wonder how the lymphatic and venous currents ever do get back to the heart, so far removed are they from its propelling influence and with so little else to aid their return. Nature, foreseeing the disadvantages under which the returning circulation labors, has wisely made the capacity of the veins double that of the arteries, and strengthened their coats by a greater abundance of condensed connective tissue in order that they may be prepared to stand a greater strain from pressure than the arteries. Still doubting her work, she has supplemented the veins with the lymphatics, but for all that, when the contraction and relaxation of the voluntary muscles no longer take place, the returning circulation languishes, and consequently the outgoing as well. Now it is that the assistance of massage becomes invaluable, for by upward and oval friction, with deep manipulation, the veins and lymphatics are mechanically emptied, the blood and lymph are pushed along more quickly by the additional *vis à tergo* of the massage, and these fluids cannot return by reason of the valvular folds on the internal coats of their vessels. More space is thus created for the returning currents coming from beyond the region *masséed,* and the suction power induced at the same time adds another accelerating force to the more distal circulation. In brief, the effect may well be likened to the combined influence of a suction- and force-pump, and in people that are not too fat the superficial veins can be seen collapsing and filling up again as their contents are pushed along by the hand of the *masseur.* In this way the collateral circulation in the deeper vessels is aided and relieved, as well as the more distal stream in the capillaries and arterioles. One would naturally suppose that the circulation in the larger arteries would in this manner be interrupted, and such is the case. But herein comes an additional advantage to aid the circulation, for the temporary and momentary intermittent compression causes a dilatation of the arteries from an increased volume of blood above the parts pressed upon, and as soon as the pressure is removed this accumulation rushes onward with greater force and rapidity into the partially emptied continuation of the arteries, in consequence of the force of the heart's action and the

resiliency of the arteries acting upon the accumulated volume of blood. By means of a glass tube inserted into a blood-vessel it has been shown that the blood passes three times more rapidly through a part that is being *masséed* than when it is not. But the same pressure, as we have seen, also acts upon the tissues external to the blood-vessels, causing a more rapid absorption of natural and also of pathological products through the walls of the lymphatics and venous capillaries.

The apparent mystery and contradiction of many physiological experiments need seldom arise, if it only be borne in mind that irritation, when mild, produces symptoms of stimulation; when stronger or longer continued, symptoms of exhaustion. Thus gentle centripetal stroking, though soothing, is, in a physiological sense, a mild irritant of the superficial vessels, causing a narrowing of their calibre and a stronger and swifter current in them by reason of its stimulating influence on their muscular coat and vasomotor nerves. But let centripetal stroking, or any other form of massage, be continued sufficiently long, or become stronger, and hyperæmia will result, indicating relaxation of the vascular walls due to over-excitation or exhaustion of the tone of their muscular coat and vasomotor nerves. But retardation is obviated by the mechanical effect of the massage pushing along the returning currents, so that the ultimate effect in either case is an increased rapidity of the circulation.

It will now be evident that massage rouses dormant capillaries, increases the area and speed of the circulation, furthers absorption, and stimulates the vasomotor nerves, all of which are aids and not hinderances to the heart's action and to nutrition in general. Seeing that more blood passes through regions *masséed* in a given time, there will be an increase in the interchange between the blood and the tissues, and thus the work done by the circulation will be greater and the share borne by each quantity less.

Exercise accelerates the action of the heart and after a time diminishes blood-pressure, which means an increase in the rapidity of the current and in the quantity of the flow through the relaxed, distended, or stretched blood-vessels. Massage also diminishes blood-pressure, but without increasing the activity of the heart. On the contrary, the heart's action is generally lessened in force and frequency. And, on reflection, this is what might be expected,

for natural obstacles to the circulation are gravity and the friction of the blood against the walls of the vessels, and these, working backward to the heart, have to be overcome at each systole of the left ventricle. These hinderances are by massage, both directly and through the medium of the vasomotor nerves, in great part removed. The contracting hands of the manipulator are, as it were, two more propelling hearts at the peripheral ends of the circulation coöperating with the one at the centre, and the analogy will not suffer if we bear in mind that the size of one's heart is about as large as the shut hand, and the number of intermittent squeezes of massage that act most favorably on vessels, muscles, and nerves are about seventy-two per minute, which is about the ordinary pulse-rate. If this is not an art that does mend nature, what is?

But the walls of the blood-vessels possess an intrinsic tone of their own, whether dependent on some local nervous mechanism or not. The muscular walls of the vessels, like those of the intestines, are composed, as we know, of involuntary muscular fibres which respond by contracting very slowly on the application of stimuli, mechanical or other. Voluntary muscles for a short time after death or removal from the body will contract readily on being pinched, percussed, or galvanized, and when they cease to respond they can be temporarily restored by injecting fresh arterial blood through them. Involuntary muscles can also be made to contract in their peculiar, slow, vermicular manner on the application of stimuli after their removal from the body, as in a piece of intestine. During life, of course, they must respond much better to the same stimuli, mechanical, chemical, electrical, or thermal. But muscles cannot contract well unless they can also relax well. Tension or extension of a muscle within natural limits increases its power of contraction. Life is made up of a series of activities and passivities alternating with each other. A heart well filled, and thus relaxed, beats more strongly than one but partially filled, and so temporary distention of the intestines increases peristaltic action. By the stretching and pressure of massage we obtain and increase extension or distention and imitate and stimulate the alternating contraction of voluntary and involuntary muscles that are accessible, and also of those that are inaccessible, by sympathy and by reflex action. Proof of this is seen in flabby and relaxed abdominal muscles gaining in tone and firmness even

while being *masséed,* and in the regulated and more vigorous action of the intestines, especially of the large intestine. So, undoubtedly, the same improvement in turn takes place in the vascular system, particularly where muscular fibres are found, as in the veins, lymphatics, and smaller arteries.

Physiological experiments which involve section or destruction of tissue are usually of too pathological a character to present a trustworthy analogy between themselves and what takes place in the uninjured body under similar circumstances. But when they agree with clinical observation and common sense they may be accepted as corroborative testimony. Thus we would judge of the experiments of Golz (Virchow's Archiv, Bd. XXVIII., page 428), in which, after opening the abdomen of an animal and applying percussion over the stomach and intestines, the peritoneum at first became paler from constriction of the vessels, but on continuing the percussion this was soon replaced by dilatation. When the percussion was first applied thoroughly over the abdominal walls, and these laid open afterwards, it was observed that the vessels of the abdominal cavity, especially the veins, were dilated and distended with blood. The distention was due to relaxation of the vascular walls caused by the mechanical irritation, and this might have been increased to the extent of paralyzing them. The heart's action was materially retarded owing to the reflex influence of the percussion upon the inhibitory action of the vagus, and also to the sudden withdrawal of blood into the abdominal vessels. The pulsations of the heart gradually became less and finally ceased. Respiration also became less frequent and finally ceased, and symptoms of motor paralysis were induced in like manner. In practice the lesson drawn from these experiments would be that percussion briefly applied may be used to cause vascular contraction, longer continued to induce dilatation.

The experiments of Bernard on dogs gave results similar to those of Dr. Beaumont on the inner coat of the stomach of Alexis St. Martin. When the mucous membrane was gently stroked with a glass rod, the natural pale pink color became rosy red and secreted juice abundantly; but when violently rubbed the color disappeared and became pale, the secretion of gastric juice stopped, the mucus increased, sickness and vomiting followed. The primary dilatation of the vessels caused by gentle stimulation seemed to be replaced

by contraction under more violent irritation, the opposite of what usually occurs out of the stomach.

A long series of experiments on men and dogs has been made by Dr. Glovetsky in order to elucidate the influence of abdominal massage upon the circulation and respiration. He found that the upper part of the body increased in weight after the *séance,* and that during the massage both the upper and lower extremities increased in volume, but returned to their normal size after massage. The upper extremities more often showed a rise in bulk while the lower were found not infrequently to have decreased in volume. The blood-tension and intracranial pressure invariably rose during the massage and lasted for a certain period after. The pulse at first became quick and smaller, but at the end of the *séance* it was full and slow. Respiration became more energetic and in artificial respiration the cardiac action was benefited.*

THE EFFECTS OF BATHS, MASSAGE, AND EXERCISE ON THE BLOOD-PRESSURE.

That distinguished old mirror of the profession in England, the *Lancet,* has been rather slow in waking up to the merits of massage, yet what it has had to say of late on this subject is of so much importance that we can afford to let French and German literature rest for a time while we briefly report what our English cousins have been doing in this line.

In the *Lancet* for June 10, 1899, Drs. Edgecombe and Bain have given a detailed account of their experiments to determine the effects of baths, massage, and exercise on the blood-pressure. For arterial pressure the radial artery was taken, the subjects being recumbent, with the arms extended in a line with the heart. For venous pressure the veins in the back of the hand were taken in some, in others those of the forearms. Ten subjects were experimented on, and the results were confirmed by repeated observation.

Cold.—The effect of the cold bath was to raise the arterial and to lower the venous pressure. When to cold percussion was added in the form of a strong needle douche applied simultaneously to the surface of the whole body, the arterial pressure became raised to a greater extent than with cold alone.

* Vratch, No. iii., 1889.

Heat.—The effect of warm baths of plain water, on the other hand, was to reduce the arterial pressure to an extent roughly proportionate to the increase of temperature. The fall in venous pressure was in greater proportion than the fall in arterial.

Heat and Cold Alternately.—In the alternating needle-bath, or Scotch-douche, where the temperature is made to rapidly oscillate between warm and cold, the net result was a rise in arterial with a slight fall in venous pressure.

Massage.—Observations proved that general dry massage in the form of *pétrissage,* while it may cause an initial rise of blood-pressure of brief duration, produced as a net result a fall in arterial pressure both mean and maximum, provided the abdomen was not *masséed* too vigorously. Deep massage and compression of the abdomen caused an immediate rise in blood-pressure by dispersion of blood accumulated in the splanchnic veins into the systemic circulation. The venous pressure was observed to be always relatively, and in some cases actually, raised, the amount of rise appearing to depend to some extent on the temperature of the room, being greater in a warm atmosphere. This confirms the experiments of Drs. Brunton and Tunnicliff on cats, who demonstrated some years previously that massage of a considerable muscular area caused first a rise in the general blood-pressure, which was followed by a fall, in some instances as much as one-fifth of the original pressure.

Wet Massage in the form of the Aix douche, in which massage is administered under a warm douche conveyed by a flexible pipe playing between the hands of the *masseur,* causes an increased effect—temperature added to massage. Here was observed a greater fall in arterial pressure than was obtained with dry massage, and coincidently an actual rise of venous pressure.

On the other hand, wet massage in the form of the Vichy douche, in which massage is administered under a warm needle spray, the patient being in the recumbent posture, causes a rise in all pressures,—maximum, mean, arterial, and venous. The difference between this bath and the preceding is due: (1) to the percussion of the needle-spray tending to raise the pressure, and (2) to the fact that the patient being in the recumbent posture, abdominal massage is more efficiently performed, and hence a rise in pressure results. Vigorous abdominal massage would seem to abolish the fall produced by massage of the limbs and the rest of the body,

and when this was but slightly performed, the net result was a fall. The influence of warm temperature plus massage was to considerably augment this fall. In all probability the factor primarily and chiefly disturbed by massage is the peripheral resistance rather than the output of the heart, and the result is to be attributed mainly to diminished resistance from arteriolar dilatation.

Exercise.—The effect of exercise on the blood-pressure depends on the severity of the exercise. In all forms an initial rise in arterial pressure occurs; if the exercise be mild, there is a fall during its continuance; if severe, the rise is maintained; after exercise, moderate or severe, a fall takes place. The venous pressure is raised during all forms of exercise and remains raised during the subsequent arterial fall. The return to normal after exercise takes place more or less rapidly according to the gentleness or severity of the exercise and temperature of the atmosphere.

EFFECTS OF MASSAGE ON THE NUMBER AND HÆMOGLOBIN VALUE OF RED BLOOD-CELLS.

One of the most interesting and elaborate investigations in the past few years is that of Dr. J. K. Mitchell into the effect of general massage on the blood.* These observations were made upon thirty-five people, a few of whom were well, but most of them were suffering from anæmia, slight or severe; others from anæmia from hemorrhage and from toxic causes, from chlorosis, from senile and other malnutritions, and one from pernicious anæmia. As a rule, in nearly all the cases after massage there was found a great increase in the number of red globules, and in about half the cases an addition to the hæmoglobin also. This increase was found to be greatest at the end of an hour after massage, and after this it slowly decreased. This decrease was postponed more and more when the massage was given daily; and in one case of severe anæmia that had been under rest, feeding, and massage, after all these had been stopped the corpuscles and hæmoglobin still continued to increase amazingly, thus dispelling the presumption that the improvement in these cases is due to a temporary effect.

Some cases that seemed to be anæmic were found on examina-

* American Journal of the Medical Sciences, May, 1894.

tion of the blood not to be so at all. Massage cannot manufacture blood-cells or coloring-matter; it simply puts into circulation those that are dormant in the system. This state of things, as Dr. Mitchell aptly puts it, "may be like the want of circulating money during times of panic, when gold is hoarded and not made use of, and interference with commerce and manufacturing results."

The same thing has not always the same effect. That often depends on the previous condition of the patient, as well as upon how the same treatment is applied. In two of the three persons whose blood-count was lessened after massage, active exercise had just been previously taken. One had walked two and a half miles on a very cold day, the other a mile. In both of these there was marked diminution of the red globules after massage. This author thinks that inasmuch as these cases had already an increased activity of circulation from exercise, the rest and the massage tended towards a reduction of their blood-globules. But he does not tell us that they probably received as much temporary benefit from the manipulation as those that were resting and had an increase in the number of blood-cells after massage. A very important point that he has called attention to is that headaches frequently occur after general massage in sensitive individuals as a result of temporary plethora. It need not, therefore, be regarded as a reason for stopping massage, but rather as a good indication for its continuance.

Another explanation that would better harmonize the results obtained by Dr. Mitchell is given by Oliver in the London *Lancet* for June 27, 1896. He found that exercise, massage, and electricity increased blood-pressure and concentrated the blood, and that any influence causing rise of blood-pressure would slightly concentrate the blood. Lowering of blood-pressure, as when the arm was passively supported over the head, caused dilution of the blood.

As Mosso has discovered that when the blood of a fatigued animal was injected into another at rest, symptoms of fatigue were induced in the latter, it is not unlikely that when massage is applied to a fatigued person the blood of the same resumes the condition of that which it has when he is rested, for massage certainly dispels fatigue, often in a very short time.

In a patient who had been a great pedestrian, and often suffered from severe and long-continued pains in the calves of his legs after walking, Professor William W. Keen found an albuminuria of from

three to fifteen per cent., which disappeared quickly when he was resting, but reappeared promptly when he resumed walking. Without any walking the urine was examined before and after the patient had submitted to massage for from forty to fifty minutes, and not a trace of albumin was found. This certainly would indicate the promotion of nutrition without such changes of blood-pressure and vasomotor tone as induced the albuminuria after voluntary exercise. Edelfsen and Leube have observed transient albuminuria in healthy men after severe exercise, more especially in soldiers after a long march.

THE INFLUENCE OF MASSAGE UPON THE FLOW OF LYMPH.

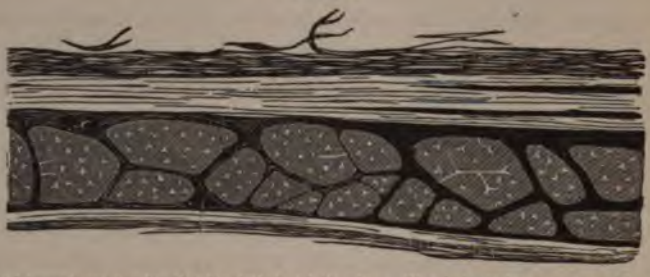
If we first call to mind the great extent of ramifying tubes and cavities formed by the deep fascia and investing membranes, we will more fully realize the importance and significance of the function of the lymph-spaces in fasciæ presently to be spoken of. Besides enveloping the four hundred muscles of our bodies collectively, the fascia surrounds each by a separate sheath, and aids them in their action by its tension and pressure upon their surface. In the limbs it gives off septa which separate the various muscles and are attached to the periosteum beneath. It also forms sheaths for the innumerable vessels and nerves; and if all the organs of the body could be removed without injury to their investing membranes, there would still remain an exact outline of their form and position, and the whole body (or rather what would be left of it) would present a skeleton of cavities and tubes beautifully adapted for the support and protection of the various organs.

Lymph-spaces existing between the tendinous fibres of fasciæ are connected with lymphatic vessels.

The researches of Genersich have shown that the fasciæ, by virtue of this structure, play a very important part in keeping up the flow of lymph through the lymphatic vessels. A piece of fascia was removed from the leg of a dog and tied over the mouth of a glass funnel with the side next the muscles uppermost. A few drops of a colored turpentine solution were then placed upon this surface, and the fascia alternately stretched and relaxed by partially exhausting the air from the funnel and allowing it to return again. In this way the colored matter was made to penetrate into the spaces between the fibres of the fascia and to enter the lymph-

spaces upon the opposite side. The same result was obtained wh
the coloring matter was injected between the muscles and the fas
and the latter stretched and relaxed by passive movements of t
limb. Experiments on animals, where the flow of lymph throu

FIG. 34.



Injected lymph-spaces for the fascia lata of the dog. The injected spaces are black. (After Ludwig and Schweigger-Seidel.)

the thoracic duct was measured, showed that passive movements increased this flow in a striking manner. Galvanization of the muscles had a similar but less powerful effect. The alternate widening and narrowing of the lymph-spaces between the tendinous fibres seemed, therefore, to cause absorption of the lymph from the neighboring parts as well as its onward flow into the lymphatic vessels, the valves in these latter preventing a flow in the opposite direc-

FIG. 35.

Section of the central tendon of the diaphragm. The injected spaces, *h* and *h*, are black; at *f* the walls of the space are collapsed. (After Ludwig and Schweigger-Seidel.)

tion.* This generally overlooked function of the fascia certainly affords a partial but important, and, so far as it goes, very satisfactory explanation of the success of methods of treatment involving passive movements, for the removal of worn-out matters from the tissues is undoubtedly favored by an increased flow of lymph.

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Here we have one of the secrets of nature revealed to us, and one which she is continually performing as one of her regular functions, by means of voluntary and involuntary muscular action. But in admiration of this comparatively recent discovery of the function of lymph-spaces in fasciæ we must not forget that the lymphatics are still more abundant in organs that are well supplied with blood-vessels such as the muscles. The meshes of the lymphatic plexus being interposed between those of the capillary blood-vessels, in the transudation of the nutritive fluids from the latter to the former the intervening tissue is completely traversed before passing through the point of junction of two or more lymphatics in the middle of the space surrounded by the adjacent blood-capillaries. But the removal of effete matters from the tissues is not the only function of the lymphatics, for while the blood is being returned to the heart and lungs by the veins, the lymphatics take up more slowly the fluids which have served for nutrition and growth, and also the superabundance of nutritive fluid not immediately required for the nourishment of the tissues. The lymphatics in accomplishing this, besides their primary and peculiar function of endosmosis, are materially aided in their absorptive power and centripetal movement of lymph by the pressure of the blood, by the natural elasticity of the tissues, and by the contraction and relaxation of the muscles. Now all these forces can be increased to a much higher degree by the externally applied pressure of massage, which, being intermittent, does not hinder the circulation. The pressure of a fluid from endosmotic action alone can support a column of mercury at the height of six hundred millimetres (twenty-four inches), and soluble substances that will not ordinarily transude may be made to do so by increasing their pressure or rapidity of movement. Repeated measurements have shown me that eight or ten minutes of deep massage on a leg of ordinary size has caused a temporary decrease in the circumference of the calf of one-fourth of an inch. If massage be continued until a markedly hyperæmic condition results, it is doubtful if the limb more than resumes its former size at the same sitting, even when in the intervals between the applications increased growth is going on. Lassar found that massage of the lymphatic glands, whether healthy or inflamed, caused large quantities of lymph to escape from them, but electrical irritation had no such effect.

The peritoneal and pleural cavities and all the other serous sacs are in communication with the lymphatic vessels. The cavities of the pleura and peritoneum are now regarded as extensive lacunæ in the course of the lymphatic vessels; lymph-spaces and lymphatic vessels communicating with each other by means of small openings, or stomata, have been demonstrated in these membranes, and also the communication of the lymph-spaces with the pleural and peritoneal cavities by means of intercellular openings. This has been shown by injecting these cavities with colored fluid, and after killing the animal examining the course of absorption of the fluid under the microscope. A drop of milk placed on the peritoneal surface of the central tendon of the diaphragm, which had just been removed from a recently-killed animal, was seen under the microscope running in convergent currents to certain points on the surface of the tendon, and thence the milk-globules were observed penetrating into the lymphatic vessels. In the respiratory movements of alternate expansion and contraction of the chest-walls, with descent and ascent of the diaphragm, we have a continual pump-like action of absorption and onward expulsion in the lymph-spaces and lymphatic vessels of the pleura and peritoneum as well as in those of the muscles and fasciæ of the chest and abdomen. It will now be evident why the Kings of the Sandwich Islands had themselves *lomi-lomied* after every meal as a means of aiding their digestion, for the external intermittent pressure over the abdomen would in all probability force the contents of the lacteals, or lymphatics of the small intestine, onward, at the same time aiding them in their absorption of digestive products. A similar effect would be exerted upon the blood-vessels of the intestinal villi.

Reibmayr inserted a small glass tube into the lymphatic vessel which accompanies the saphenous vein of a dog, and found that no flow of lymph took place through this so long as the leg was quiet. But as soon as the paw was moved, or muscular contractions were excited, lymph flowed freely from the tube. Centripetal stroking or kneading of the paw, although this was at rest, had the same effect. At first the flow was abundant, and then gradually diminished, and after a short interval increased again. Lassar had similar experience with the paws of dogs in which inflammation had been artificially produced. When the inflamed leg was manipulated or passively moved, lymph flowed abundantly from

the divided absorbents, and this was much greater in quantity than that obtained from a sound leg of the same animal by like procedures. The flow was seven or eight times more plentiful than that from the sound leg, and in the latter it was only obtained with much greater efforts of kneading and passive motion. The inflamed and swollen extremity diminished in circumference, and finally the flow ceased altogether. Considerable time elapsed before lymph could be again obtained in this manner. From these experiments may be drawn the inference that there is a limit which must not be overreached in practice, the sensations of the patient and the state of the affected parts often indicating that the limit of temporary benefit has been obtained.

Not only is the effect of massage upon the rootlets of the lymphatics in the fasciæ and muscles of the greatest interest, but of quite as much importance is its influence also on the large lymph-cavities accessible to its intermittent compression, such as the peritoneal cavity, the synovial cavities, and the cavities of the sheaths of the tendons.

The experiments of Reibmayr and Hoffinger, showing that the absorptive power of the peritoneum is increased by massage, support clinical observations, and are regarded as very satisfactory. Measured quantities of water were injected into the peritoneal cavities of rabbits. The animals were killed at the end of one and two hours respectively, and the quantity of fluid remaining was ascertained in each case without any massage being used. The same quantities of water were injected into the peritoneal cavities of other rabbits, and their abdomens were kneaded for a short time every fifteen minutes. Some of the animals were killed at the end of an hour, others at the end of two hours, and the fluid remaining in the peritoneal cavity of each was accurately measured. Though the natural absorptive power of the peritoneum is very great, yet under the influence of massage twice as much fluid was absorbed during the first hour as there had been without massage. During the second hour, on the contrary, only half as much fluid was absorbed under massage as without; but notwithstanding this, there was so much more absorbed altogether during the two hours in which massage was used, that the total amounted to thirty-nine per cent. more than the total without massage. The proportion absorbed without massage to that with massage was as 7.40 to 10.29,

the difference, 2.89, being a fraction over thirty-nine per cent. more than without massage. (Reibmayr has made an error in his own figures in stating this difference, 2.89, as per cent. In calculating the proportion of fluid absorbed to that of the weight of the animal, Reibmayr has made another error in not distinguishing any difference between grammes and centigrammes. Thus in experiment No. iv. he states that one hundred and five centigrammes were absorbed, and that this is 10.29 per cent. of the weight of the animal, ten hundred and twenty-three grammes,—just one hundred times too much. He has applied the same method of calculation to all his other experiments. By centigrammes he doubtless means grammes; so that we are pretty safe in concluding that the quantity of fluid absorbed was about one-tenth the weight of the animal, certainly a very large quantity.)

These experiments would again point out the lesson that there is a limit to the benefit to be derived from a single *séance* of massage, beyond which it is useless to prolong it. But these observers, to whom we are already so much indebted, should have made a third series of experiments showing the quantity of fluid that might have been absorbed during an hour of repose, following an hour of massage, to compare with the results of two hours with and without massage.

EFFECTS OF MASSAGE UPON THE SECRETION OF THE GLANDS.

Colombo, of Turin, before the Société de Biologie on January 25, 1895, gave an abstract of experimental researches which he made in the laboratory of M. François-Frank at the College of France. These experiments were done upon dogs in order to find out the effect of massage—applied locally in the region of each gland or collection of glands—upon the secretion of gastric juice, of bile, of saliva, of urine, of semen, of tears, and of sweat. He has collected directly the secretion from each organ studied, the gastric juice by means of a gastric fistula, the bile by a biliary fistula, the saliva, the urine, the sperm, and the tears by means of canulas introduced into the canals of Steno and Wharton, into the ureters, into the vasa deferentia, and into the naso-lachrymal canals. The sweat was obtained from a man by means of a hot bath. He ascertained the quantity and the chemic composition of the secretion which was produced by each gland, or collection of glands, in a

certain lapse of time without massage. After massage he made the same examination of these secretions which had flowed in the same length of time.

Gastric Juice.—In consequence of massage, the quantity of liquid which flowed through a gastric fistula for two hours was more than double that which flowed in the same time without massage. A part of this was mucus, the remainder gastric juice. Massage for five minutes caused but little variation in the secretion, but continued for fifteen minutes the maximum of secretion was produced. When the massage was prolonged beyond this time, the proportion of hydrochloric acid and pepsin did not increase any more, but the mucus became more abundant and the gastric juice was more diluted.

Bile.—The quantity and the chemic composition of the bile secreted during four hours did not vary appreciably after ten minutes of friction upon the hepatic region and of *pétrissage* or kneading of the lower border of the liver. But after ten minutes of *trepidation* (shaking or vibration) and of *tapotement* or percussion the quantity of bile increased considerably in the next four hours. The cholesterin and the biliary soda salts were more abundant. After twenty-five minutes of friction and of *pétrissage* the same results were obtained as after ten minutes of *trepidation* and *tapotement*. The maximum result was obtained by combining ten minutes of *trepidation* and *tapotement* with ten minutes of friction and *pétrissage*.

Saliva.—The submaxillary glands were more sensitive to massage than the parotid—their secretion began to increase after five minutes of massage, and after ten minutes of massage the maximum secretion was obtained either in the submaxillary glands or the parotid. The saliva which flowed from the glands was similar to that which was obtained by exciting the chorda tympani; it was clear liquid, was very watery, and was rich in alkaline chlorids.

Urine.—The quantity of urine secreted by the kidneys during four hours, the region of which had been submitted to massage for ten minutes, was increased. There was a diminution of the specific gravity, and at the bottom of the vessel there were abundant deposits of epithelial cells, and slight traces of albumin were found. The other constituents did not vary. Subsequent examinations

showed that the albumin existed in the urine only during the five minutes after massage; later it was not found.

Sperm.—The testicle that had been *masséed* secreted during twenty-four hours almost double the quantity of semen that was secreted by the other testicle that had not been *masséed.* The sperm collected from the divided vas deferens was reduced to that of testicular juice. The quantity was small and showed an increase of water, of chloride of sodium, and of phosphate of spermatin. The spermatozoids were numerous and active.

Tears.—Massage applied to one of the lachrymal glands produced by a reflex bilateral action an equal increase of secretion of both glands. The liquid which was secreted during six hours in consequence of massage was of the same chemic composition as that secreted by excitation of the trigeminus, it was clear and watery, and the chloride of sodium in it was considerably increased.

Sweat.—The perspiration collected after massage was more profuse than without massage in the same length of time, twenty minutes. Its density was diminished; it was rich in chloride of sodium, showed a slight alkaline reaction, and was relatively deficient in potassic salts, in urea, and acids. It also presented a deposit of superabundant epithelial cells.

General Conclusions.—According to these results, viewed collectively, it would seem that we observe not only an increase of the specific elements of each secretion in a constant measure, but also a still more considerable increase of the water in which these elements are dissolved. We can, therefore, it seems to us, infer that the massage acts by a double process—on one hand it accelerates the function of the glandular epithelium; on the other, and perhaps in a still greater measure, it determines in the organ a more abundant afflux of blood, which favors filtration.

EFFECTS OF MASSAGE UPON THE NERVOUS SYSTEM.

Upon the nervous system, as a whole, massage most generally exerts a peculiarly delightful, and at the same time profoundly sedative and tonic effect. While it is being done, and often for hours afterwards, the subjects are in a blissful state of repose; they feel as if they were enjoying a long rest, or as if they had just returned from a refreshing vacation, and quite frequently it makes optimists of them for the time being. An aptitude for rest

or work usually follows, though generally those who submit to this treatment feel gloriously indifferent, and needless apprehensions are dispelled. With much less expenditure of time and money a course of massage at home serves many much better than a vacation with anxiety about business. I have never known anyone to take cold or suffer from exercise in the open air after general massage when ordinary care was observed. An able writer in the *British Journal of Medical Sciences* recommends massage "for certain melancholics with trophic and vasomotor affections, and where dementia is threatened after an attack of excitement. Under this treatment, mental comfort and a sense of well-being take the place of apathy and lassitude." Through the medium of the central nervous system, even local massage is radiated or reflected throughout the body, thus acting at the same time as a nervous and vascular revulsive, or physiological counter-irritant, if one may be allowed this expression. One of the best examples of this, perhaps, is the relief of headache from the manipulation of the back and shoulders. It has long been well known that stroking the limbs often induces sleep. Massage of one part of the body is sometimes accompanied with a peculiar but not disagreeable sensation of tingling or crawling in some other part. In one person this was experienced on the outside of the thigh while the corresponding side of the head was being *masséed;* and in another in one leg while the other was being acted upon. In two persons I have witnessed an approach to syncope from the first attempt at massage of the head. Such peculiarities must be very rare, and also those idiosyncrasies in which massage cannot be tolerated at all when it is apparently indicated. A more frequent concomitant of massage is that of an agreeable thrill, such as we are apt to experience on the receipt of joyful news or on learning of heroic actions. Morbid irritations are reflected in a similar manner, but with different effect. We all know the general depressing effect of local pain, and we also know that neuralgia or other trouble sometimes appears distant from the original seat of disturbance, and in no way connected therewith, except through the cerebro-spinal axis. The transmitted and reflected influences of massage must evidently be as extensive as the distributions and connections of the sensitive nerves that are accessible to its impression. Briefly it may be said to act on distant parts by sympathy, by reflex action,

and by inhibition. Mechanical impressions, such as massage and its variations, are more like electricity than anything else, and their effects are in general proportionate to their quantity and intensity. Physiologists who have the means and opportunity would do well to investigate and compare the effects of each. In the connection of sensitive nerves with sensitive nerves there results from mechanical impressions modifications of sensation. In the connection of sensitive nerves with motor nerves we have from massage reflex influences on motion; and when sensitive nerves convey the impressions of mechanical influences to secretory fibres we get reflex effects upon secretion; upon nerves connected with inhibition there results inhibition of motion, secretion, etc. Through the fifth pair of nerves and its connections we have external impressions conveyed to sight, hearing, smell, and taste, as well as to motion, besides the immediate effect on sensation. No wonder that massage of the head has such a powerful and far-reaching influence. In a word, we have in the human system a harp of a thousand strings, and he who would play upon them had better know something of their construction and use and have some experience in pressing upon them.

This brings us to a consideration of the immediate effects of massage upon nerves, for on their integrity depends the perfection of their functions. The immediate effect of massage by gentle stroking in producing a soothing sensation upon the seat of action and the agreeably benumbing effect of vigorous pinching have already been referred to. Percussion is a good means of exciting languid nerves, and it may be continued sufficiently long and vigorously as to overexcite them, thus wearing out their capability of perceiving impressions and allaying morbid irritability. But massage may be exerting a favorable influence upon nutrition in general, while the patient is totally indifferent as to the usual agreeable sensation of its application, and why? Because, undoubtedly, the nerves are insufficiently nourished, and may continue so in spite of suitable food and tonics and ordinary exercise until their languid circulation is aroused by massage. This has the same effect upon the vessels of nerves that it has upon those of muscles, and ultimately, though not so soon as in the case of muscles, the same result is obtained, improved nutrition and with this improved function. When we call to mind that the essential element

of nerve-fibres, the axis-cylinder, is a delicate, soft, solid, albuminoid substance possessed of a certain degree of elasticity, we can readily see that the alternate contraction and relaxation of voluntary muscles upon nerves passing through, under, or between them must be of considerable importance in keeping up their normal tone. In the absence of this mechanical stimulus, a still greater of a similar kind can be made to take its place by the intermittent pressure of massage, which should be of a uniform character in its imitation of muscular action, and this will be so much greater as the increase of pressure made by massage is greater than the compression that the muscles in contracting make upon each other, plus the influence of the compression of massage upon the cutaneous, subcutaneous, and other accessible nerves not directly squeezed by muscular contraction, and all this while the nerves are at rest, which is still another advantage. If nerve-force cannot give itself expression in motion, there may be, and often is, too much left that goes to the account of sensation, and in this way the balance is often upset, giving rise to sensory disturbances. In an article published in 1874 I said: "It is not desirable to consider massage, or any other method of treatment, a panacea, but it is evident how extensive its usefulness may become when we reflect upon the number of maladies that doom patients to a long period of inertia, the result of which is often to cause a preponderance of sensory phenomena, usually styled *nervousness,* for lack of some treatment like massage to preserve the natural irritability and use of the muscles, and thus allow the motor nerves to give expression to the excitations to which they are subject in common with sensitive filaments." This feeble attempt at prophecy has been rather more than fulfilled. There are those who have overtaxed their motor functions, and others still who have exhausted motor, sensory, and intellectual powers, and need absolute rest, at least for sufficient time to give their recuperative force a chance to assert itself, before massage should be employed.

It is supposed, but not proven, that in life the axis-cylinder of nerve-fibres is in a fluid condition, and that the transmission of sensations and the impulse for movements are carried along by literal wave-like movements. If this were true, the immediate and remote effects of massage would be easily understood. Some people, having in mind the undulatory theory of the transmission

of light and sound, speak of sensation and motion as travelling along the nerves in a similar manner by vibrations; and the modification of these by massage and percussion they put down positively as the way in which benefit results from this treatment. Certainly it is not the only way. When an excitation takes place in a nerve, a change in its electric state is said to occur, and assuming the axis-cylinder to be made up of electric molecules, it is imagined by Du Bois Reymond, Ludwig, Virchow, and others that every two of these molecules take up an altered position with regard to one another at the moment the stimulus is applied. But this cannot be seen, except on paper and with the mind's eye. Excitement in all nerve-fibres is capable of transmission in both directions, and when action occurs only at one end, it is because there is a terminal apparatus capable of expressing the action present at that end. Hence we have the influence of massage passing in both directions at once, whether owing to a change in assumed electrical molecules or not.

It all depends on the previous condition of nerves as to how they will react to any stimulus applied to them. Slight mechanical irritations arouse their activity, moderate increase it, strong hinder or inhibit it, and very strong abolish it. But stimuli of sufficient strength to increase the irritability of a healthy nerve might be strong enough to inhibit or extinguish the activity of a nerve already in a state of increased irritability. The activity of a nerve may be so exhausted that the strongest stimuli will have no effect upon it. In 1872 Dr. S. Weir Mitchell called attention to his interesting observation that when a column of mercury in a tube one-tenth of an inch in diameter was gradually applied to the sciatic nerve of a rabbit for twenty or thirty seconds, it took a pressure of twenty inches of this to abolish the power of the nerve to convey to the muscles the impression made by galvanism,—contractions. When this pressure was removed a gradual return of this power of transmission occurred, although fifteen seconds elapsed before it began to show itself.*

The molecular forces, cohesion, adhesion, and chemical affinity, prevail in the tissues of the body as well as out of it, and the beneficial effects of massage are, no doubt, in great part due to its

* Injuries to the Nerves, 1872, page 112.

influence in bringing about molecular changes in the nerves and muscles and tissues generally, by which the chemical combinations that form the bases of the body are favored, the separation and elimination of others hastened, and greater activity and better equilibrium of the vital forces promoted. Respiration is deepened and more prolonged; the stretching of the air-cells by inspiration and the passage of carbonic acid and oxygen through them stimulate the terminal filaments of the pneumogastric nerve; this stimulus is conveyed to the medulla oblongata and the respiratory centre is excited, which in turn sends motor impulses to the phrenic, intercostal, inferior laryngeal, and other nerves. The diminution of the respiratory movements, the lessening of blood-pressure, and the increase of the normal irritability of the muscles all correspond to an increase of oxygen and a lessening of carbonic acid in the system. These also are in harmony with the diminished action of the heart obtained by massage, for the cardio-inhibitory centre is in all probability affected by sympathy with the neighboring respiratory centre in the medulla oblongata, as is also, undoubtedly, the vasomotor centre.

The results of Tigerstedt's experiments on the action of mild forms of extension showed that the irritability of nerves increased under moderate extension, but grew less when the extension was increased beyond a certain limit. These results were constant and satisfactory. Zederbaum has demonstrated that when sudden and heavy pressure is applied to nerves their irritability is rapidly lessened, but when the same pressure is gradually increased up to the same extent the decrease in irritability is not so marked and occurs more slowly. It has been found by Luderitz that motor nerve-fibres are more easily paralyzed by continuous pressure than sensitive ones. The quality of percussion, whether light or strong, seems to have an effect upon nerves similar to pressure applied in like manner. Light percussion increased the irritability of nerves, while slow and strong percussion exhausted them. Quickly repeated percussion increased the contractility of muscles supplied by the nerve operated upon, but if kept up for a comparatively long time exhaustion of the nerve resulted.*

* Dr. George W. Jacoby in Journal of Nervous and Mental Diseases, April, 1885.

Upon sensitive nerves percussion produces effects similar to what it does on motor nerves: when lightly applied, at first there is an increase of pain which soon diminishes, then disappears altogether and gives place to complete loss of feeling. The more sensitive the nerve the less force and time are required to bring about these changes. Now this is quite analogous to the effects of percussion on the vascular system, which at first causes contraction and later dilatation, and if longer continued symptoms of paralysis of the vascular walls. This is all in harmony with my statement that irritation when mild produces symptoms of stimulation, when longer continued or increased in severity, symptoms of exhaustion.

I have found that the points that give the best contraction to percussion are also the same points that give the best contraction to the faradic current, and it is often surprising how much better contraction may be obtained from percussion than from a faradic current.

It is a wonder that greater thermal changes are not produced by massage, for arrested force, as friction, percussion, and compression, develop heat in the body as well as outside of it. Cooling by radiation and insensible perspiration lessen these so that they do not correspond to the usual comfortable warmth and glow that patients experience from massage. Elevation of temperature is often probably greater with the manipulator than it is with the patient, owing to an unnecessary expenditure of force.* The effects of vigorous exercise on temperature have, to my knowledge, never been thoroughly studied any more than the action of alcohol on the circulation.

With those in whom the temperature is normal a change is not likely to occur from massage, but if the temperature be a degree or so below normal, a rise to normal or very near will usually follow. In nervous or hysterical women with high or low temperatures Dr. S. Weir Mitchell often noticed at first a slight fall in the thermometer, then a fairly constant rise, and as health improved less marked changes. He found the most noticeable rise in those who had some organic disease and a natural liability to great

* When there is a marked elevation of temperature of 6° to 10° F. from massage, as in the case of children suffering from essential paralysis, Dr. Mitchell attributes part of this rise to the contact of the warm hand, and this certainly is very much warmer while doing massage.

changes of temperature. Zabludowski found that the perception of temperature was lessened by massage, though at first it was slightly increased. My own experience has shown me that patients are much more indifferent to extremes of heat and cold after massage than they were before.

By a series of careful and elaborate observations on healthy people Dr. Symons Eccles found that under the influence of general muscle-kneading the axillary and surface temperature invariably rose while the rectal temperature fell,—the axillary rose on an average 1.4°, the rectal fell .8°. The opposite effect was produced by kneading the abdomen. When this was done immediately after the general muscle-kneading the axillary temperature fell 2° and the rectal gained 2.2° under thirty minutes of abdominal massage, which made a difference of .6° less for the axilla and an increase of 1.4° for the rectum from what it was before the general massage.

General muscle-kneading caused a variation in the pulse-rate from a diminution in most cases to an increase of twenty beats a minute in a few. But in these cases, whether the pulse was accelerated or retarded, there was always an increase of blood-pressure, even when the skin was red and warm and the vessels dilated, due, it seemed to be, to increase in the force of the action of the heart. Stroking or effleurage alone increased the pulse-rate.

Massage may be exerting a beneficial or harmful influence when neither pulse nor respiration gives any indication of it, but there are other means of judging.

Under the direction of Professor William Winternitz, of Vienna, Dr. Otto Pospischil has made some calorimetrical studies, and amongst these some showing that mechanical irritation, as by friction and rubbing the skin, increases the heat-loss about ninety-five per cent. Hence the value of friction of the skin in fever with excessive retention of heat. In other words, we suppose this means that cooling by radiation is favored. And thus would be verified the saying of Celsus, that "a patient is in a bad state when the exterior of the body is cold, the interior hot with thirst; but, indeed, also the only safeguard lies in rubbing, and if it shall have called forth the heat into the skin it may make room for some medicinal treatment."

The effects of massage in changing the response of muscles to

electricity has already been mentioned. But further observations in this and other directions are necessary in order to show in what ways the natural or inherent electricity of the tissues is altered by means of massage, whether currents are changed in strength or direction so as to be beneficial or not, or whether the alteration of the natural currents may only serve as a favorable or unfavorable indication. It can be no longer doubted that changes of some kind do occur, for decomposition of natural electricity takes place whenever bodies are subjected to disturbances of any kind, be it friction, percussion, heat, or chemical action. The electrical properties of tissues are regarded as in direct proportion to the activity with which changes of matter proceed in them, and as massage produces rapid nutritive changes, it would be expected to proportionately alter the electrical properties of tissues. Even dissimilar stretching of the skin has been shown to give rise to electromotive action. The palm of the hand has been found to be negative to the back of the hand, the whole hand negative to the elbow, to the chest, and usually to the foot; and currents are found to pass from a longitudinal surface to a transverse section of muscle, nerve, or brain, and during the contraction of a muscle or the activity of a nerve the natural current diminishes. But while there is no lack of evidence to show that currents are constantly passing in and between the tissues of the same individual, there is as yet no proof that electricity can be transmitted from one person to another. Those who talk so much about imparting their own electricity or magnetism are usually too ignorant to comprehend the one experiment that comes nearest affording them grounds for their assertion. Thus, Professor Rosenthal has shown that the power of the will can generate an electric current and set the magnetic needle in motion simply by contracting the muscles of one arm while the other is at rest. The current then ascends the contracting arm and goes to the passive one, and this may be reversed if the muscles of the passive arm be contracted while the other rests.

The manner of doing massage which I have described, one hand contracting as the other relaxes, would, as shown by this experiment, give the patient the benefit of the doubt as to whether a to-and-fro current could, in this way, be made to traverse the tissues manipulated, and thus combine a utilization of force with ease and efficacy of movement. Certainly, the way in which the so-called

magnetic doctors work is not in harmony with this experiment or the way of doing massage here described. But still the benefit, if any, that might be derived from this source would be so little in comparison to the other effects of massage, that it would be much better to take at once a definite quantity and intensity of electricity directly from a battery.

Hysterical women may, but are not likely to, be put into an hypnotic state by means of massage, just as they might in other ways, by gentle prolonged stimulation of the sensory nerves of the face or of the optic or auditory nerve. Heidenhain considers that in this condition there is inhibition of the activity of the ganglion-cells of the cerebral cortex, and that this is not due to anæmia reflexly produced by contraction of the cerebral vessels, for he induced hypnotism in one person during the action of nitrite of amyl, which dilates the blood-vessels.

Further discussion of the physiological aspects of massage might be indulged in without exhausting them. It will not be forgotten that "the limits of science are like the horizon, the more we approach them, the more they seem to recede from us," and that a lifetime is considered too brief to investigate the action of a single drug. The same remark may be applied to massage which that able therapeutist, Professor H. C. Wood, has made about medicines: "In what way medicines produce changes in the life-actions of various parts is, and probably must ever remain, unknown, precisely as it is beyond the limit of human intellect to know why the nerve-cell or the spermatozoon performs the prodigies of which it is capable." But discuss any therapeutic agent as we may, there is something still peculiar to each that evades expression by tongue or pen. Of what use is it to describe odors, tastes, sensations, sights, and sounds? They can only be comprehended by smelling, tasting, feeling, seeing, and hearing. Just so with the peculiar calm, soothing, restful, light feeling that is the most frequent result of massage, which cannot be understood until experienced. It doubtless arises to a great extent from the pressure of natural worn-out *débris* being speedily removed from off terminal nerve-filaments. Furthermore, massage excites and awakens the *muscular* sense in an agreeable and beneficial manner such as nothing else does, restoring idiomuscular contractility and extensibility; and we know that the state of our muscles indicates and often

determines our feelings of health and vigor or of weariness and feebleness. Estrádère sums up the effects of massage in the following beautiful language: "I think that this happiness, this quietude, this respiration more free, these ideas so pleasing, are the result of the equilibrium which at this time reigns in all the functions. The nervous system, no longer requiring to exert itself against obstacles to respiration, to circulation, and to nutrition, enjoys a tranquillity almost equivalent to repose, and then this state of oblivion *de la vie expectative* in some manner leaves the imagination to dwell upon the ideas of beatitude which come in multitudes to occupy the nervous centres, and these now have no need to concentrate a certain part of their activity to control the functions—to subdue some and to stimulate others."

Massage in the Neurasthenia and Anaemia of Women.

> "The veins unfill'd, our blood is cold, and then
> We pout upon the morning, are unapt
> To give or to forgive; but when we have stuff'd
> These pipes and their conveyances of our blood
> With wine and feeding, we have suppler souls."
>
> —*Coriolanus*, Act V., Scene 1.

Professor Biddle, of Jefferson Medical College, than whom a more stately orator never graced a lecture-room, used to wind up his course of lectures on materia medica and therapeutics by saying in the most earnest manner, "and, gentlemen, when everything has failed, you must advise your patients to fall back upon the comforts and consolations of religion." Nowadays, when everything fails, it is the fashion to fall back upon massage, and this is too often expected to act like an antidote to poison, and indemnify patients for the inefficiency of previous treatment, which they are apt to regard as a vexatious loss of time. If benefit results, they wonder why this was not suggested or tried sooner.

In 1872 I wrote an essay in which I ventured to predict that, at the rate at which nervous diseases were on the increase, some means would surely arise to better aid in their treatment, and possibly help in preventing them, and that this means would very likely be massage. Here are the words: "Statistics show that nervous diseases have been keeping pace with civilization at a fearful rate. In the city of Chicago the average proportion of neural deaths to the total mortality was, in the five years beginning with 1852, one in 26.1. In the five years from 1864 to 1868 inclusive, the proportion was one nerve death to every 9.9 of all deaths." * Such inroads upon human health are not likely to continue long without some fortunate means springing up of preventing, alleviating, or curing them; not the least amongst these, and perhaps the most natural and agreeable, will probably be massage.† Time

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* Wear and Tear, by Dr. S. Weir Mitchell.

† Graduating Thesis, 1872.

has justified this prediction, and every physician who within the past twenty years has taken any interest in massage is amazed at the apathy of his brethren towards the value of this treatment in properly selected cases, while the brethren have always had a private opinion of their own that rubbing was a good thing if it could only be done in the right manner and at the proper time. But this interest is not limited to any one branch of medicine, for concerning the extent of the usefulness of massage it may with safety be said that, at tolerably definite stages in one or more classes of affections in every special and general department of medicine, evidence can be found that it has proved either directly or indirectly beneficial or led to recovery when other means had been but slowly operative or apparently had failed altogether. According to the requirements of individual cases, massage may be of primary importance, or of secondary importance, of no use at all, or even injurious. In what affections and at what stages is massage beneficial? Briefly answered, for the present, in local and general disturbances of circulation, locomotion, and nutrition in their incipient stages or after the acute symptoms have passed away. At the commencement of many affections, local congestion and irritation will often be relieved by massage, and this may serve for cure or prevention of further mischief. In cases that have come to a stand-still or lapsed into a chronic condition, languid circulation will be aroused, waste products absorbed, and nerves and muscles nourished and strengthened. So much for general considerations. Let us be more special.

In recent times, *as an auxiliary* in the treatment of neurasthenia and impoverishment of the tissues in females, massage has won great merit under the direction of Dr. S. Weir Mitchell, who, as artist and architect, has succeeded admirably in combining the very natural remedies of rest, quiet, food, massage, and electricity, so as to build anew the broken-down constitutions of many hopeless invalids. These are patients who have got into a state of *hibernation* from some physical or mental strain, less often from sheer indolence, so that they have become so weak and wakeful and full of aches and pains that they cannot get up until their blood has been replenished and their tissues re-formed, until they have been soothed and comforted to sleep by the warm hands of the manipulator, and their muscles aroused to action by lightning strokes of electricity skilfully let loose upon them. Then at last comes the

welcome command, inspired by experience and judgment, to get up and walk. Certainly this is wonderful, considering that it is usually accomplished in the brief space of two or three months against illnesses that have kept patients in bed sometimes for years. Playfair mentions cases that were cured by this combination of treatment who had been bedridden invalids for six, nine, sixteen, twenty, and twenty-three years respectively, and some of these were such sufferers that they had to be transported under an anæsthetic from their homes to London for treatment. A comparison of Playfair's patients with those of Mitchell would tend to show that cases of nervous prostration and hysteria in the higher walks of life get into a much worse condition in England than they do in America. It is presumed, however, that they are more numerous in America than in England on account of atmospheric peculiarities, high pressure in education, greater social claims, and less physical exercise. But this is by no means certain, if we may judge by the present alarm of English sanitarians about the evil tendencies of their system of education and cramming, and other matters alike prejudicial to health in England as in America.

The best summing up of the nature and symptoms of the cases under consideration was given by Goodell in his "Lessons in Gynæcology," as follows: "The general pathology of such a neurosis is not perfectly clear, but it probably consists, as Beard first pointed out, essentially in malnutrition of nerve-centres, followed by disturbances in their circulation from weakened innervation. These secondary disturbances consist of local anæmias and of local hyperæmias. In other words, in that equilibrium of wear and repair which means health, a disturbance occurs which means disease. There will be sudden ebbs and flows of impoverished blood in the various vital organs—the same kind of surface flushings and blanchings going on in the deeper structures. Thus we may see in the same person, and starting from one cause, alternations of anæmia and hyperæmia of brain, stomach, or spine. The cerebral exhaustion or irritation manifests itself by clavus, wakefulness, heaviness, asthenopia, and by inability to read or to write, or to concentrate the thoughts on any given subject; the exhaustion of the stomach by flatus, nausea, gastralgia, capricious appetite, and so on; the spinal exhaustion by tender spots, backache, and weariness. The anæmia of the reproductive organs is exhibited by amenorrhœa

or by scant menstruation, by neuralgic and hysterical pains; the hyperæmia by congestion, dysmenorrhœa, menorrhagia, and leucorrhœa, by uterine flexions and dislocations, and by a variety of subjective and objective phenomena with which every physician is familiar."

After a careful diagnosis, which is by no means always easy, in order to decide that there is no organic disease of the nervous system, the essentials of the treatment consist in secluding the patient from over-sympathetic friends, in absolute rest, in carefully regulating the diet by commencing with small, definite quantities of skimmed milk, and gradually increasing this and other food until incredible quantities can be assimilated, and all this is made not only possible but decidedly advantageous by the daily use of massage and electricity. It is needless to say that this combination of treatment, in order to be successful, must be dispensed under the guidance of a firm, kind, and skilful physician, who studies each case on its own merits, varies the treatment according to circumstances, and administers tonics and laxatives as may be indicated. Local treatment when necessary does not conflict with the measures first spoken of, though in general the advocates of the rest-and-food treatment prove that there has been overmuch topical treatment. In the therapeutics of these cases the first place is accorded to massage; but just what is meant in the chapter on Electricity in "Fat and Blood," by the remark that "no such obvious and visible results are seen as we observe after massage" is not very clear. What obvious and visible results? Are not the contraction of the muscles and the elevation of temperature caused by electricity more evident than the less immediately apparent effects of massage? Not any clearer, but equally valuable as the opinion of an acute observer, is the brief sentence of Professor Playfair, that "electricity forms a valuable subsidiary means of exercising the muscles." The manner of using the electricity is of interest. Slow interruptions of an induction current, one in every two or five seconds, are preferred. These allow distinct contractions and relaxations of the muscles, and cause dilatation of the blood-vessels. They are, therefore, closely imitative of the physiological functions, as is massage. The difference between the continuous and interrupted currents is considered by some good observers to be owing to the difference in their time of passing. "The

faradic currents are lacking in the chemical power of the continuous current because they pass so quickly that they have not time to exert a chemical influence. Gunpowder can be passed so quickly through the hottest flame as not to ignite it." This leads us to say that massage is often done with too great rapidity, especially for its best effects in nervous cases, for it takes time to communicate sensation, and if sensations are painful, they take four times as long to pass through the spinal cord and reflex action is excited, which means that the patient involuntarily resists the impression. I have elsewhere stated that percussion is to massage what faradization is to electricity, and will often answer the same purpose; manipulation or deep-kneading is to massage what the constant current is to electricity, and the ultimate effects of each are very much alike. In *Schmidt's Jahrbücher* and elsewhere instances are recorded in which massage has succeeded after electricity and other means had failed. The reverse of this may be true, but as yet the proof of it has not come before me.

Massage is seldom disagreeable, even from the first, if sufficient tact is used. When, however, at its commencement it is unpleasant, it soon becomes acceptable, so that it is looked forward to as a luxury and a pleasure, and spots that are sensitive, tender, and painful can gradually be encroached upon and soon disappear. It is not unlikely that as the quality of the massage improves the quantity necessary for these neurasthenics will be less. The fact that grease is so constantly and freely used is an indication of the quality; and two doses of an hour to an hour and a half daily seem inordinately large and frequent. When a patient is at all subject to the influence of massage, subsequent applications of the same force and duration as the first have an increased effect, so that if half-hour applications at first had any apparent effect, the result would probably have been the same, even if the time had not been extended. It is but fair to say, however, that the later massages may be much longer and stronger than the earlier, and, indeed, there may be no end to the acquired tolerance and pleasure of the patient to the vigor and duration of these treatments. They may end in useless indolence and luxury unless there is a clear head and a strong will to push the patient along and supply the missing link between will and action. It is still a question to be decided what the minimum of massage may be that will do the

greatest good in any given case. Many a time I have relieved a tired headache and put a wakeful patient to sleep by ten minutes' massage of the head alone, when subsequent applications of longer duration, including both head and body, had no greater effect. Who knows but we may yet have a homœopathy in dosage of massage? As to the frequency of applying massage, common sense would say let it be repeated before the effect of the previous treatment has passed away, so that a cumulative effect may be obtained; and as to the length of time the manipulations may be continued, common sense would again speak and say, so long as the patient improves, or until recovery results. In the absence of accurate doses of massage, Mitchell and Playfair have adopted the safest plan by using probably more than sufficient, and pushing this and all the other means previously mentioned with an energy from which there was no appeal. The results have more than justified the methods, and the best cures have been obtained in the worst cases of long standing, bedridden, and wasted invalids. There is a definite reason for this not yet explained, but which becomes clear on the application of the principles of treatment here inculcated. Those patients who have had a long period of rest have already undergone in this a great part of the treatment necessary to make them responsive to the remainder; while with others who still struggle on, growing worse at every effort, it is necessary that they should be put to bed and absolute rest enforced. From this combined method of treatment Professor Playfair says he has had more satisfactory and surprising results than he has ever before witnessed in any branch of his professional experience.* Of course, it is not likely that any but men of great prestige and long experience would be intrusted with the care of such apparently hopeless invalids, where the trouble and expense of carrying on the treatment are so great. Illustrative cases might be given if space permitted.

There has been and still is a muttered growl of discontent on the part of many of the profession that the author of "Fat and Blood" has only published a few of his successful cases. No one can accuse him of lack of candor if they will bear the following words of his in mind: "I might multiply these histories almost

* Page 85, Nerve Prostration and Hysteria.

endlessly. In some cases, I have cured without fattening; in others, though rarely, the mental habit formed through years of illness has been too deeply ingrained for change, and I have seen the patient get up fat and well only to relapse on some slight occasion."

The author of "Nerve Prostration and Hysteria" sums up his experience in saying that, on looking back at his cases, the only ones with which he had any reason to be disappointed were those in which the primary selection had been bad; and in the few in which the results were not thoroughly satisfactory, he had doubt as to their suitability for this treatment which he expressed beforehand. These included one case of chronic ovarian disease and one of bad anteflexion with fibroid enlargement of the uterus, in both of which the local disease prevented really beneficial results. In a third case he had to stop the treatment in a week on account of cardiac mischief; two others were cases of positive mental disease; and in one there was epilepsy. Whether it was the rest, seclusion, and feeding or the massage and electricity that seemed to be at fault in the case of cardiac trouble is not stated. In one case of nervous prostration with old-standing uterine disease in which a fibroid tumor had been removed by Spencer Wells, but which subsequently grew again to nearly the same size as before, and was then accompanied with endometritis, vaginitis, piles, and prolapsus of the rectum, in which nutrition was at the lowest ebb and the patient was taking large doses of morphia and chloral, Professor Playfair undertook the treatment reluctantly, but his efforts were crowned with ultimate success. During the last month of treatment the uterine symptoms were not complained of and were not inquired about. Of course, the uterine fibroid could not have been removed by massage alone, but many women have similar growths that do not affect them.

Goodell mentions the following cases to show that the success of the treatment here referred to does not always depend upon a rapid increase of flesh: "Miss K. R., who had excruciating suffering at her monthly periods, defective locomotion, and other marked uterine symptoms, besides great nervous prostration, became well, although she gained but five pounds. Mrs. M., a sterile lady with a heavy and tender retroflexed uterus, and with prolapsed ovaries, was wholly relieved of ovaralgia, menorrhagia, and other grievous

symptoms which for years had embittered her existence, yet her gain was but seven pounds. Miss P., also with prolapsed ovaries, and with a coccygodynia so severe that at one time serious thoughts were entertained of removing the coccyx, was restored to health with but little gain in flesh." These cases got well with little or no local treatment, the essential part of the disturbance, in Dr. Goodell's opinion, being in the nerve-centres, and requiring only rest and nourishment, sleep and freedom from pain, and, as means of obtaining these, massage and electricity.

Of value as corroborative testimony is a well-written article on the rest and feeding treatment from the pen of Dr. F. W. Page, whose extensive experience as physician at the Adams Nervine Asylum has favored him with advantages for its study and observation enjoyed by few, if any. It is entitled "The Permanency of the Rest Treatment," and is published in the Boston *Medical and Surgical Journal,* 1882, page 77. The author tells us that in order to overcome the evil effects of prolonged rest massage is employed, and the next element, which is merely an auxiliary, is electricity, the effect of which is to accomplish what can usually be done much better by manipulation and with less pain and discomfort. When applied with a weak current and slow interruptions, he finds it usually agreeable. Proofs of cure are founded on personal examinations after one or two years' time. The length of time during which the majority of these patients had been invalids varied from two to fifteen years, and the average duration of the treatment of patients in the Asylum was three months and three weeks. The patients who recovered made an average stay of four months and three weeks, while those not relieved only made an average stay of two months and twelve days. In a later report the following observations of Dr. Page are full of interest and instruction: "The value of rest and seclusion as remedial agents is an exceedingly interesting question, in view of the rather indiscriminate application which has been made of this treatment to all forms of nervous disturbances, whether of cerebral, spinal, or peripheral origin. This method of treatment is of great value in many disorders. In hysteria it assists by its discipline in regaining self-control, but *not* in melancholia. On the contrary, its use in cases of *depression* invariably aggravates rather than soothes or mitigates the symptoms, and I do not now resort to it in the treatment of this class

of patients. In nervous exhaustion, so called, whether of cerebral, spinal, or mixed types, it is more certain of satisfactory results than any other plan yet tried. It retards waste, checks morbid activities, and prevents the drains and lesser strains so fruitful in perpetuating this condition. Whether imaginary or real, the confused thought, the supposed loss of memory or its sudden lapses, the weakness of vision, the irregular and varied forms of circulatory disturbance, the disturbed digestion, the motor irregularities, incapacity for work, insomnia, and all other symptoms speedily disappear under its judicious use, seldom to reappear. Neurotic traits, whether psychological or not, manifest themselves in parents and children for successive generations. Even disturbed nerve-functions, like migraine and neuralgia, perpetuate themselves in different members of a family through a long line of descent. Always quiescent in good health, these neuroses promptly manifest themselves whenever nutrition is seriously disturbed."

Before the publication of the valuable experience of the gentlemen above mentioned, Dr. Henry B. Stoddard and the writer published the results of massage * alone in a few cases similar to those here referred to. Our use of this treatment in such cases was unknown to each other until Dr. Stoddard sent me a report of his. My first case is of interest as showing that when everything had apparently failed, and exercise, though it could be taken, was of no use, massage improved the physical condition of the patient without corresponding gain in the mental. In this last respect the truth of the conclusions of Playfair and Page is striking; not, however, to the extent of regarding massage as contra-indicated and likely to aggravate depression or mental disease; for I take it that they have reference rather to rest and seclusion, and to massage only as a means of employing these without impairment of nutrition. Miss F., twenty years of age, was a short, stout lady, well nourished, slight amount of adipose, of a plethoric, ruddy appearance, and good muscular vigor. She had never studied too hard nor overworked in any way, but had always seemed to be in a depressed state of mind. She complained at times of fulness in the head with slight vertigo and general discomfort. At fourteen

* Massage in Amenorrhœa and Dysmenorrhœa. Boston Medical and Surgical Journal, February 10, 1876.

years of age she began to menstruate, and this function continued to recur for three and a half years, but was always from ten days to three weeks too late. The menses then ceased for two years and a half, and the best experts could discover no local cause to account for the interruption. During this interval tonics, emmenagogues, horseback riding, and a year's travel in Europe were tried, but without effect. Though the physical condition of the patient seemed good, her body well nourished, her complexion ruddy, her sleep and appetite fair, she became more and more low-spirited, for which she, or rather her relatives, sought the advice of Dr. John F. Tyler. He advised a course of massage. In January, 1875, when I began giving her massage, she had been in the habit of walking two or three miles daily; but it was only from a sense of duty and with great effort and disinclination that she did anything, physical or mental. There were no sanguine expectations on her part of benefit from any treatment whatsoever.

The mode of procedure was manipulation of the limbs, back, and abdomen, with percussion to the back and resistive movements of the feet, legs, and thighs in all their natural directions, together with passive and resistive circumgyration of the trunk. The treatment was administered for three-quarters of an hour every other day. After seven such treatments the menses came and lasted three days, though rather scanty, having been suspended for two years and a half. Throughout the following month the same treatment was continued, with a view of increasing nerve-force and correcting probable vasomotor disturbance, but resistive movements were omitted until within a week of the next expected monthly period. The menses, this month, appeared five days later than what was considered the proper period, though formerly at the best they had always been from ten days to three weeks too late. Treatment was now discontinued until within a week of the next expected return. The catamenia this time did not appear until nineteen days after the proper date, and this delay was attributed by the patient's highly intelligent relatives to the discontinuance of massage for three weeks. This view would seem to be favored by the result of the ensuing month, for massage was resumed two weeks prior to the hoped-for event, and exactly twenty-eight days from the last period the catamenia again returned. The next month the patient had four visits in the ten days preceding the

natural time for recurrence, and this took place one day earlier than the normal interval. The quantity each time after the first was what the patient considered to be about natural. Thus far the treatment seemed to have an increased effect and the patient an increased susceptibility to it, even though it was lessened in frequency and not increased in quantity. Without further massage or other treatment all the functions continued regular for several months, and a year and a half passed before I again heard from the patient, when I was sent for and learned that the catamenia had been absent for three months in spite of all ordinary remedies. Massage was again resumed with even more favorable results than before, and in a few months the patient started for Europe. At the time of her departure her mental condition did not seem to have improved, but I have since learned that it did afterwards to a marked degree, and that the beginning of this, partial and impartial observers agree in dating from the time massage began.

At the first visit this patient's tissues seemed to me to be exceedingly dense, matted, and inelastic; at the fourth visit they were much more supple and elastic, and continued so to be, in consistence with her easy mode of living.

In marked contrast with the condition of the tissues in the previous case, and the effect of massage upon them, is the flabby, atonic state of muscles resulting from long illness in the following case, which might well illustrate the aphorism of Hippocrates that "hard rubbing binds," while the one just related might show that "soft rubbing loosens." After unusual exertion and anxiety in nursing her mother and sister, Miss A. suffered great nervous prostration. The trouble at first, the patient said, was all in her head; she was very wakeful and had frequent attacks of hysteria. Several months later she was seized with intestinal catarrh, and as this was accompanied with great pain, it aided very much in reducing her. From this she gradually recovered so as to be able to sit up for a few minutes at a time. A persistent backache and profuse leucorrhœa called attention to the uterus, which was found to be anteverted. When tenderness had subsided so as to admit of a Hodge's pessary, this, with a bandage around the abdomen, afforded great relief. Menstruation was regular as to time, though painful and scanty, lasting but a day, and passing only when the patient was sitting up. In the mean time, the hysteria continued,

at times closely simulating peritonitis, and her physician, Dr. J. T. G. Nichols, of Cambridge, from whom I got the main points of her history, informed me that hysterical convulsions, mania lasting from a few hours to several days, and transient aphonia were also of common occurrence. Injections of assafœtida alleviated these attacks, and a course of tonics and electricity had improved her so that she could be up four hours daily, an hour or two at a time. Excepting the occasional use of a vegetable bitter, nothing had been administered for two or three months, when Dr. Nichols kindly referred the patient to me for massage, because he thought that the muscles might in this way receive the exercise which they so much needed.

Massage was begun in May, 1875, when the patient had been an invalid for over two years. At this time she was taking nothing but a gentle laxative every day. For a while at first careful manipulation alone had to be used in this case, as anything like passive or resistive motion, except of the feet and arms, was very apt to give rise to abdominal pain, which was frequently referred to one or the other of the ovarian regions, and sometimes followed by hysterical convulsions. After my second visit the laxative was laid aside in the hope that the kneading of the abdomen would produce the same effect; and in this we were not disappointed, as she had a natural daily dejection without medicine. She had massage two or three times weekly for ten times before her next monthly period. When this arrived the menses came, somewhat to our surprise, while the patient was lying down. This was the first time that the flow appeared in that position for sixteen months. She was under massage for two months longer, and in each the menses came with lessened discomfort and while the patient was in the recumbent posture. With regard to the aches and pains, those of the back and head, as well as the uncomfortable feelings in the abdomen, were alleviated at each application of massage, and the patient was greatly soothed, sometimes to sleep. The cold hands and feet were made warmer, not merely for the time, but permanently. The muscles gained in size and firmness, and the patient walked with much less scuffling of the feet, and went up and down stairs naturally. But still she was very much of an invalid, unable to ride in a carriage without suffering pain in the back and abdomen, though she could walk short distances with ease. In her great de-

sire to get well she overestimated her improvement, while the previous case probably underestimated her ameliorated condition. In this second case, the combined treatment of Dr. S. Weir Mitchell would no doubt have brought about recovery.

Dr. Stoddard very kindly sent me his notes of the two following cases in which he employed massage, not by relegating it to the nurse or one of the patient's relatives, as is usually the way, when it is almost sure to be done in a slipshod manner, or, what is worse, overdone, but by applying it himself. "A patient of a spare habit and decided nervous temperament, suffering from chronic inflammation of the uterus with ulceration and also from nervous prostration, in addition to other troublesome symptoms, was the subject of obstinate sleeplessness which had lasted for some time before she came under my care. Nature's sweet restorer was usually sought in vain till three or four o'clock in the morning, when a couple of hours of uneasy slumber were obtained. At my suggestion she had used various remedial agents, chloral, bromides, lupulin, hyoscyamus, and morphia, alone or in combination, for several weeks, but with indifferent success. One evening I was induced to employ massage for the first time in her case, in the hope of relieving the reflex pain in the back and limbs, which at that time was especially troublesome and persistent. The application proved so agreeable to my patient, and so promptly and effectually relieved the pain for which it was employed, that at the same sitting I extended its use to the rest of the body, and with a very gratifying result; for soon after I left her a drowsiness which was then quite evident passed into a quiet and refreshing sleep, from which she did not awake until six A.M. Its subsequent employment in this case never failed, except when severe pain was present, to secure for her a good night's rest. Furthermore, its regular employment three times a week for three weeks after the first trial not only much improved the capillary circulation, which had been quite languid previously, but seemed to be largely instrumental in securing a regular and healthy menstrual flow after an absence of at least six months. A variety of emmenagogues had previously been prescribed without effect. I take this occasion to state that, at the time referred to, this patient had been taking for some weeks a preparation of quinine, strychnia, and phosphoric acid, and was under local treatment for the uterine inflammation, and that in my judgment important indications were

met by massage when other remedial agents proved inadequate or were but slowly operative. In this case a nervous headache to which she had long been subject was always much alleviated by the application of massage to the head."

Dr. Stoddard's second case is as follows: "I have under my care another patient with uterine inflammation of eight or ten years' standing, characterized by an enlarged and indurated cervix and retroflexed body of the uterus, with marked menstrual irregularity and severe dysmenorrhœa. When she came under my care, some two years since, the approach of the menses was accompanied by excessive pain and a series of hysterico-nervous convulsions. She was also the subject of a variety of reflex symptoms, amongst which may be cited, as most prominent, pain and tenderness of the sacro-iliac region and over the entire spinal column, sleeplessness, attacks of numbness in the extremities of a very decided character and attended with flexor spasm, a feeling of pressure at the vertex, dyspepsia, and meteorism. For the dysmenorrhœa and resulting convulsive attacks, the subcutaneous injections of morphia proved the only effective remedy. Happily the local and general treatment had very much modified the tendency to such seizures. But for the relief of some of the more constant reflex symptoms massage proved a very hopeful agent. Spinal and sacro-iliac pain and tenderness have been very much relieved by its local use, and its regular employment over the whole body three times a week, while not directly inducing sleep, as in the previous case, has seemed to tranquillize the nervous system and render it more susceptible to chloral and other hypnotics; and the attacks of numbness and flexor spasm have been much diminished in frequency and severity during its use. Applied to the head, massage has had a decided influence in temporarily relieving that sense of fulness at the vertex which is so common and annoying a symptom in uterine disorders. The meteorism in this case had been for several years a persistent and troublesome symptom. I have often seen the abdomen distended to as great a degree as if she were at the close of gestation, tense and tympanitic, and productive of marked dyspnœa and cardiac spasm by the upward pressure. Massage, locally applied, has been more effective in relieving this condition than any other means employed. Repeatedly has its thorough application, extended over a period of fifteen or twenty minutes, been followed by a subsidence

of the tympanites and a restoration in good degree of the natural softness of the abdomen, with a corresponding relief of pain. Incidentally, the constipated condition naturally attending such atony of the muscular coat of the intestines has been in a measure corrected by the repeated applications."

These four cases are fair examples of what may be expected from massage in doubtful, half-and-half cases, which every physician knows are so difficult to manage, and Professor Playfair says of such that they are the only kind that have caused him disappointment. Dr. Stoddard remarks that many times he would have been at his wits' ends without massage. His observations of the increased effect of tonics and sedatives, which prior to massage had been comparatively inert, are worthy of notice; for the more perfect the circulation, whether this be caused by massage or otherwise, the better will medicines of all kinds be distributed through the system and the greater will be their effect. But the inherent qualities of massage alone are also soothing and invigorating, and often as apparent as in Dr. Stoddard's cases when all previous medication has been left off.

So often have I observed an increase in the quantity of the catamenia and an earlier appearance than usual in ladies who are to all intents and purposes well, and who have had massage of the back or general massage for some slight ailments, that I have come to regard this as one of the physiological effects of massage. Even massage of a leg for a joint or muscular affection is frequently followed by an earlier appearance and a longer stay of the monthly visitor. In amenorrhœa or dysmenorrhœa, where neither local treatment nor operative procedure is indicated, massage would seem to be a good means to employ, especially in atony of the nervous system and when there is not present any abnormal state of the blood or of any of the pelvic organs.

In the cases mentioned in this chapter it is not considered a good sign if the limbs persist in growing cold under the stimulation of massage. This means augmentation of the vasoconstrictor function of the nervous system, while the favorable effects of massage are manifested by warmth and comfort, and agree with what we understand to be an increase in the vasodilator function. Even so with vigorous exercise, it is not beneficial if a person turns pale and his blood-vessels constrict, for too much blood will be repelled to

internal organs. The primary agreeable sensations of a moderate dose of alcohol are due in a great part to the same effects as usually result from massage or exercise, increased peripheral circulation and increased capacity of the vessels to accommodate it.

How much more massage and general measures of treatment may yet encroach on the domain of gynæcology remains to be seen. This will be best determined by the coöperation of the far-seeing neurologist and the skilful gynæcologist. "Every one," says Dr. T. Gaillard Thomas, "who has had experience in the treatment of these disorders must have been struck with surprise at the wonderful improvement exerted upon cases which have long resisted local means by a sea-voyage, a visit to a watering-place, or a few months passed in the country. Not only is the improvement manifest in the general state of the patient, it shows itself locally also, and in some cases complete recovery may be obtained." When these fail, try massage. The original compounder of rest, seclusion, and excessive feeding, made available by massage and electricity, deserves the everlasting gratitude of the profession and the public, for in this and other ways he has fulfilled the prophecy of Dr. John Hilton, who said, "As the most precious treasure is the most securely hidden, as the solicitous and patient explorer sees no charm in trophies won with ease, so I am assured that the industrious laborer who will pry with bright and peering vision into the mazes of the nervous system, and apply to the treatment of its manifold derangements the principles of rest, will reap his reward."

It is generally conceded that it is difficult to ameliorate the condition of fat, anæmic, and neurasthenic patients. The results of massage alone in the following case far exceeded our expectations, changing a slow and tedious recovery into rapid and daily improvement, and leaving the patient in a better condition than she had been in for years. Mrs. K. was about thirty-two years of age when I was called to see her on June 12, 1877. Eight years before this she had suffered from a sunstroke, from which she thought she had recovered in a week, but at the end of four weeks severe headaches, nausea, and vomiting would be caused by any slight annoyance, and these would last for several hours, in consequence of which she was obliged to give up a responsible position which she had hitherto filled with energy and ability. Her left side, arm, and leg also troubled her from this time with numbness and slight difficulty of

motion apparent to others. A vacation of seven months was of great benefit to her, but she only partially recovered. From the time her health became impaired by the sunstroke she grew very fat, soon weighing two hundred and ten pounds, seventy pounds more than her usual weight, and this continued. At times she had been melancholic, and only strong religious convictions had kept her from committing suicide. During these eight years she had suffered at one time or another from ulceration of the cervix uteri, scanty and difficult menstruation at long intervals; piles, fissure of the anus, and prolapse of the rectum; pseudopia, photophobia, purulent inflammation of the ear, etc., etc. Thirteen weeks prior to my first visit she had given birth to a still-born child which she had carried several weeks past the full time. After confinement she was said to have had milk-legs. When first seen by me she could only take a few steps by leaning on two chairs, and then the legs, already somewhat œdematous, swelled still more and became livid. There were pain and tenderness over the whole of both legs, but especially in the course of the internal saphenous veins and on the posterior aspect of the limbs. It had only been for two weeks that she was able to step at all, and four weeks altogether that slight improvement was apparent. For four or five years she had been subject to what she called "numb spells," which would come upon the receipt of sudden news, and they had continued after confinement. At such times she was conscious of her hands, arms, and legs becoming rigid and contracted, which she would try to resist, but soon she would become unconscious and remain so for about an hour. When coming out of these attacks she would be conscious for several minutes before she could speak. Wakeful nights, morning headaches, weary days, and poor appetite were constant since confinement. In addition to all these troubles the patient was intensely hyperæsthetic all over, so that the slightest touch would cause involuntary recoil. The joints were exquisitely sensitive and rebellious to passive motion. Well, then, how was massage accomplished? Certainly not by friction, but by applying the hands slowly, gently, and firmly with deep manipulation. Thirty minutes of massage was thus given at the first visit to the feet, legs, and outer aspects of the thighs, and a few minutes to the head. During this the sensitiveness decreased, and the manipulations, from the first approach of which she flinched, became agreeable. The patient

felt a prickling sensation from the pressure of the hands, which she thought felt just like the sponges of a galvanic battery. The morning headache was relieved, and warmth and comfort prevailed in the legs, which hitherto had been cold. At the second massage on the following morning stronger manipulation was borne, and the prickling feeling was less. At this visit massage was extended over a greater surface, but the back and abdomen were still too sensitive to be touched. The morning headache was again dispelled, and the patient made comfortable for the day. At the third visit general massage was well tolerated, including back and abdomen. Relief of headache was immediate, and comfort and sleep followed. On the evening of this day she walked naturally, not sliding her feet along as formerly. The time for the massage was then changed to the evening, and good sleep with increasing appetite followed, and the patient made rapid improvement from day to day, in place of slight improvement only apparent from week to week, as before massage began. At the end of seven days she went over two flights of stairs to her meals; at the end of nine days she was assisting in her housework; on the thirteenth day walked out, and by this time it was evident by the slackness of her dress that she was losing fat. Twenty-six visits were made in thirty-nine days, and the patient made a most excellent recovery; tonicity, firmness, and elasticity of tissues took the place of the soft, loose, hydræmic condition; the constipation, piles, and prolapse of the rectum disappeared not to be heard of again; the menses made their appearance but five days overdue and three times the usual quantity (for years they had been nine or ten days behind time, and very scanty and preceded by great depression of mind). At this period there were scarcely any premonitory symptoms. It ought to have been said that the lochia pursued a natural course and the catamenia appeared ten weeks after confinement. They recurred at nearly normal intervals, with the exception of two suspensions for very good reasons, and she is now the mother of two fine children. The "numb spells" and unconsciousness did not return. Rochelle salt was the only medicine used for a few days at first, to soften the hard fæcal masses. Her diet was left to her natural inclination.

It might seem strange that massage should be tolerated at all in such a hyperæsthetic individual. Not more strange than the fact that in strychnia poisoning convulsions are excited by the

slightest touch, a draught of cold air, or a loud noise, whereas firm grasping or deep kneading of the muscles is frequently grateful. The prolapse of the rectum was severely handled in being replaced after labor, and it was agreed that the piles must be operated upon as soon as the patient's strength would permit. That this has not been necessary was an agreeable surprise. It is a matter of frequent observation that those who lift and strain at heavy weights are very apt to suffer from hemorrhoids. This may be accounted for by the forcible and long-continued contraction of the muscles driving the blood to internal organs where there is less resistance.* Massage induces just the opposite condition and aids materially by its pressure in pushing along the blood in the portal vein and its branches, "which are capable of holding the total amount of blood in the whole body" (Foster). At the same time, massage stimulates the peristaltic action of the large intestine, relieving the constipation which often causes and increases this trouble, and a free circulation is created in the skin and muscles, which should have in them about one-fourth of the total amount of blood in the body, and thus the equilibrium of the circulation is restored. In the *Clinic* for March, 1878, Dr. S. W. Garrod states that he has never failed in treating successfully hemorrhoids of the size of a cherry-stone by pinching and kneading them between the thumb and forefinger and thus obliterating them. It is often necessary to repeat this operation several times. It is a method with which I have had no experience, but it does not remove the cause of the disease. No one will be so foolish as to suppose that either local or general massage will take the place of hygienic, medical, and surgical treatment of diseases of the rectum. But in justice to myself I wish to say here that this patient was so strongly convinced of the efficacy of massage for the relief or cure of hemorrhoids that nothing would do but a friend of hers who was said to be suffering from hemorrhoids must try massage also, and so she applied to her physician for assent, not for permission, for she had previously made up her mind. From a tedious stay in bed of seven weeks after confinement this patient rapidly gained flesh and strength, but with no lasting relief to the

* Sedentary occupations, high living, and too little exercise have the same effect, and may also be counteracted to some extent by massage. Too much or too little exercise of organs alike enfeeble them.

rectal distress. When she was operated on, in place of hemorrhoids, there were found several small, solid tumors, which were removed. The patient appreciated her physician's and surgeon's derision of massage by consoling herself that inasmuch as it had put her in excellent condition for the operation, it might also enable her to get over it faster, and it did. But for something more than hemorrhoids in this case the honor and glory of an operation might have been saved. Massage is not infrequently used for preparing patients for operation and aiding their recovery afterwards.

Dr. Gage, of Worcester, kindly referred to me for treatment the following patient, who from hurry, worry, and irregular action of the heart broke down in the High School ten years before. She was thin and anæmic, but not at all nervous. Previous to her coming to me she slept steadily, but not refreshingly, her appetite was indifferent, she had no ambition to do anything, was tired all the time, and could only walk with difficulty about a mile. She had been losing ground for two years. There had been much sickness and death in the family, and she had been the nurse. Menses had always been accompanied with pain, except at last period, when she was weak and prostrated all over. With three-quarters of an hour's massage daily and a milk diet to begin with, she was in two weeks eating three full meals and two lunches every day, besides taking a teaspoonful of dialyzed iron and a tablespoonful of Trommer's extract of malt at each meal, and all with a relish. Weakness of the limbs had disappeared, and she could outwalk her well sister. Sleep was refreshing from the first massage, and the patient continued vigorous and buoyant when it was not yet the end of the third week of treatment. At first only one hour's rest twice daily was advised, and half the usual walking. In three weeks she was so well that she did not wish to rest at all during the day. The muscles, at first rigid like whip-cords, rapidly became full, elastic, and firm. Anæmic murmurs disappeared, and the patient could go up two or three flights of stairs with ease. She repeatedly remarked that the pressure of the hands in manipulation felt like the electrodes of a galvanic battery, but this sensation gradually disappeared with improvement. The catamenia became natural without pain, weakness, or prostration.

No greasy substances were used in any of Dr. Stoddard's cases or my own, and it would be well to bear in mind that the very

meaning of anointing or lubrication is the prevention of friction, call it massage if you please. In my opinion, it is a positive hinderance to massage on account of the slipping preventing the hands and fingers from seizing, grasping, and kneading the tissues. With suitable diet, superficial friction and anointing favor the nutrition of the external tissues and the increase of fat in the superficial fascia and deeper structures of the skin, while manipulation or kneading acts more on the deeper structures and muscles; and whether fat or muscle be increased will depend on the predominance of one or the other.

When I have less favorable experience with massage in cases similar to those here related I will report it. Except in cases of organic change of structure or the long-continued force of habit, massage will seldom fail to prove beneficial, unless it is evident that the case is of such a nature as to decidedly contra-indicate this treatment.

VI.

The Relative Value of Massage in Neurasthenia as Met with in Either Sex.

"*Leonato.*—Indeed, he looks younger than he did, by the loss of a beard.
"*Don Pedro.*—Nay, he rubs himself with civet."—*Much Ado About Nothing.*

"If there's a hole in a' your coats,
I rede ye tent it;
A chiel's amang ye takin' notes,
And, faith, he'll prent it."—ROBERT BURNS.

"It was well-nigh midday when Petronius awoke, exceedingly wearied, as usual. He said himself that he felt exceedingly benumbed in the morning, and had no power to collect his thoughts. But the morning bath and a careful kneading of the body done by the hands of skilful slaves gradually hastened the sluggish course of his blood, refreshed him, and enlivened him and restored his strength."—*Quo Vadis.*

IN Philadelphia there is a very distinguished and highly successful druggist who, if not born neurasthenic, has certainly been in that condition most of his life; and yet, notwithstanding this drawback, he has succeeded in amassing a large fortune. He knows how to economize and utilize his limited forces so as to direct the labors of others. He has had massage of some kind or another almost every day for thirty years in nearly all parts of the world. In 1897 he told me that there was not a good manipulator in the city of Philadelphia, and he himself was then employing one who had combined the highly consistent virtues of *masseur* and porter for many years at one of the hospitals where massage was supposed to be largely used. He had tried in vain to show this man how to do massage, but could not break him of the simultaneous *slip and grip* to which the manipulators seemed to be addicted in the City of Brotherly Love. This cannot be kept up for any length of time without chafing the skin, unless grease be used to prevent it; and as I pointed out in the *Popular Science Monthly* in 1882 that rubbing with grease was not massage, but inunction, I fear I am much to blame for many good people having their hides rasped. If it should prove that this sort of rubbing is beneficial in rousing the

latent energies of neurasthenics to resist it, then a good, stiff brush would be vastly superior to the human hand. I know whereof I speak, for to prove that my friend, the druggist, was not exaggerating I submitted to the tender mercies of two *masseurs* of reputation and was glad to escape with a whole skin.

Neurasthenia, the background to the picture of nearly all diseases and injuries, whether of an organic or functional nature, for our present purpose may be regarded from other points of view. First, there is the natural and not unpleasant fatigue, the result of an active and satisfactory day's work, from which we recover by food and sleep. Then comes the fatigue from which we do not recuperate as usual, the fatigue of being overworked, worried, or, in common parlance, we are "played out." Here rest or change of scene is of the first importance, and may be all that is necessary; but if this be impracticable or without effect, tonics and sedatives may suffice. Before rest, change, or medication had been resorted to, it has been my lot to have tried massage in several cases of this class, where it has "lifted them up out of the rut" and been the means of procuring good sleep with vigor of mind and body, so that they were able to proceed with their duties uninterruptedly and as easily as ever. Thirdly, there are the continually wearied, wakeful, and nervous business or professional men with numerous and varying ailments, who have learned by experience that "the labor they delight in physics pain," and who find more relief in work than in rest. Massage will sometimes put such on a higher plane of existence and give them a zest for work which they have not derived from any other source. But, unfortunately, the interest they gain on their stock of vitality in this way is apt to be used up as fast as it accumulates. Fourthly, there are the neurasthenics who are simply spoiled children, who have plenty to live on without work and usually more, who have little or no object in life, and who can do what they please and cannot do what they don't please, who take delight in telling of all the eminent medical authorities whose care they have been under without any benefit resulting, and who are never happier than when they can be regarded as interesting by trying some method of treatment that is novel to them in order that they may have the final satisfaction of saying that it did them no good. I well remember one such who defiantly said she would like to see any physician who could benefit her. Serious disease

came upon her. She could not or would not understand the nature of it, and allow herself to be treated as other people, and she prematurely lost her life. There is no help for such but to lose their fortune and be obliged to work. However, they form a large part of a clientèle of massage.

Fifthly, there are those who, in spite of rest, change, and medication, have become chronic neurasthenics, the result of business reverses, overwork, worry, loss of relatives, disappointed hopes, or as a sequel of some affection that has existed in some part of the system, but which has disappeared or become of secondary importance. If in these the symptoms point most prominently to spinal exhaustion,—myelasthenia,—where exercise easily tires and aggravates, massage will be of marked benefit as a tonic and sedative and corrective of morbid sensations; of less advantage, but not useless, in cases where the symptoms point about equally to easy exhaustion of spinal cord and brain. I used to think that in cases of cerebral exhaustion,—cerebrasthenia, as some call it,—where as a rule physical exercise can be freely taken, that this would be of greater benefit than massage, and that the value of the latter here was almost *nil*, and might be dispensed with, unless it were for a luxurious *placebo* to fill up time and keep the patient from trying something worse; but time and experience have changed my opinion.

The links in the chain of symptoms that point out neurasthenia or nervous exhaustion, so that they could be clearly understood as indicating deficiency of quantity or impairment in quality of nerve-force, were best connected by the late Dr. George M. Beard, of New York City. His statements will hardly be appreciated until they are independently thought out from observation and one's own conclusions compared with his. Take, for example, the following paragraph, the import of which I have known to be overlooked by three of the most eminent neurologists on this continent, to whom Dr. Beard was a next-door neighbor:

"*In cerebral exhaustion, active muscular exercise in reasonable amount and variety may be allowed and enjoined; in spinal exhaustion, relative and in some cases absolute rest is demanded, or only passive exercise for a shorter or longer time, as may be, according to the special peculiarities of the individual.*"

It does not help matters much to coin a Greek or Latin name for every symptom connected with neurasthenia; and with all the

care in naming and accounting for symptoms that Dr. Beard has shown, there are, I think, two which have not yet been mentioned, and which are, like the others, only exaggerations or perversions of natural occurrences. First, there is what almost every one has experienced, namely, an inadequate conception of passing time. Even with the same person at different times and under the same or different circumstances time may drag along slowly and heavily; at others it will seem to pass so quickly that it is impossible to accomplish anything, even if working in the greatest hurry. Haste is generally a sign of weakness. Secondly, the cause of wakefulness in some cases of neurasthenia is doubtless due to a languid condition or want of nerve-force in the respiratory centre, so that lessened respiratory movements have to be supplemented by voluntary ones which require the patient to wake, the *besoin de respirer* becoming so urgent that respiration cannot longer go on involuntarily.* Even in health excessive fatigue may prevent sleep. The cardio-inhibitory and the vaso-motor centres in the neighborhood of the respiratory centre may be affected by sympathy with the latter, or they may suffer from impaired nutrition, deficient nervous energy, or irregular blood-supply, as may other nerve-centres. But to return, for the relief of incorrect appreciation of time and frequent repetitions of waking up at night, as well as for the majority of other symptoms of neurasthenia, massage has proved an efficient agent in my hands. The feeling of loneliness and depression that is so apt to come in the night-time when people are run down or in ill-health is usually dispelled very promptly by means of massage. In this and other respects its action is similar to the primary and agreeable effects of opium and alcohol in restoring tone to the respiratory centre and vascular system, without, however, the injurious after-effects of these internal remedies. In place of headache, drowsiness, and disordered digestion, which are so apt to result from the use of hypnotics and stimulants, after sleep from massage the patient

* This sentence was published in my first edition in 1884. In 1897 Dr. S. Weir Mitchell wrote:

"When for some reason the respiratory centres are diseased or disordered, a man may possess enough ganglionic energy to carry on breathing well while the waking will can still supplement the automatic activity of the lower centres. But in sleep, these being not quite competent and volition off guard, there ensues a gradual failure of respiration and the man awakes with a sense of impending suffocation."—*Clinical Lesson on Nervous Diseases.*

is refreshed and buoyant in mind and body. Massage does more than this: it will often counteract the disagreeable feelings that result from the necessity of taking sleep-producing medicines or too free indulgence in alcoholic stimuli. In several instances I have noticed that patients were more susceptible to the agreeable influence of massage while they were taking morphia,—the opposite of what might be expected. I know of at least one physician who considers Mr. Bombast, who pretends to have rubbed all the royal highnesses in Europe, a good man to finish off a fellow who has been on the spree by a rubbing.

There are some people who are born neurasthenic, go through life neurasthenic, and die neurasthenic. Some of these never know that they are lacking in nerve-force, while a few of them do find out, from an occasional day of good feelings or lucid intervals, if one may say so, that their customary vigor is far below what it ought to be. If this class could have massage for a long period or all their lives, they would get a great deal more out of what makes life worth living for. There are those who seldom feel any lack of energy so long as they are occupied, but who have a hard struggle to rest and go to sleep; and these are benefited by massage. Massage is often the only remedy for numerous and indescribable unpleasant feelings, and the subjects of these who have experienced the relief it affords crave its application as they do food and drink when hungry and thirsty. But most physicians know how fickle neurasthenic patients are; for, even while improving, they will often suddenly give up treatment, for no apparent reason except it be that they are afraid of getting well.

In these and other cases where massage seems to be indicated, it may be given daily or every other day, locally or generally. If there be no apparent effect from this treatment at or soon after its application, it is well to repeat it daily until the latent energies of the patient seem to be rousing, as shown by increase of comfort, vigor, and sleep. Then the intervals between the massages may be lengthened, but not to the extent that the effects of the preceding manipulation may have entirely passed away before another is administered. In some patients reaction is slow, and they feel better the day following that on which they have the massage than they do the remainder of the day on which it is given. In such cases every other day is sufficiently often to manipulate. Massage

of the back alone will often relieve fulness of the head and headache, and this repeated may be all that is necessary. Massage of the back and head will more frequently be used, but general massage is the best for the majority. I have more than once defeated the object in view by overdoing massage on starting, when, as the sequel showed, fifteen minutes would have been all that the patient could take with advantage. I have sometimes overdone the matter at the patient's own request for a longer application, though I had warned him beforehand; and, following the advice of an eminent physician, I have sometimes used massage too freely. The argument too often used, that massage can do no harm if it does no good, is a dangerous one. When a man understands one branch of the medical profession well, one of the commonest errors is to suppose that he understands all the rest equally well, as if our knowledge of massage, like everything else, did not come through experience.

The time of day at which massage should be given is in some cases of importance. If a patient be not very weak, as a general rule, I prefer the time of day at which he feels the worst, or just before this, so as, if possible, to tide him over this period, which can sometimes be done. When a patient does not sleep well, the later in the day massage can be done the better. When a patient of a nervous temperament sleeps well, massage should not be administered in the evening, as it is very sure to make him wakeful, and this applies to such as are well in their nervous system, but may require only local massage for a joint or muscular affection. These are so refreshed after massage that they do not feel the need of sleep. Patients may be benefited by massage when they are too weak to travel. It requires a certain quantity of nerve-force to sustain life at its lowest ebb; more than this, to receive massage with benefit; still more, to be able to travel; and more than all, to exercise freely.

The following two cases are of interest as illustrating good effects from massage when the usual immediate and agreeable effects of it were absent on account of continued mental and bodily activity. Mr. K., a vigorous adult, had confined himself closely to business, both late and early, and had not taken his usual vacation the previous summer. For eight months prior to his sending for me, in March, 1883, he had suffered from wakefulness. He went to sleep readily, but woke up after four hours and remained awake the rest of the night. He had as a result a lack of energy and aptitude

for work, but kept at it. In eight days I gave him seven massages of back and head in the evening. With these, continued and refreshing sleep returned, and he has been well ever since.

Dr. B., in the prime of life and in good health, had been on the witness-stand for several days undergoing a fire of cross-questioning involving vast interests in one of the most useful inventions of the age. Insomnia followed, and it was impossible for him to take a few days' vacation. In order to please his wife he submitted to massage three times, every other evening, and sleep and vigor promptly returned. A few days' rest and absence from work would either have cured these cases or have made them susceptible to the pleasant effects of massage. This treatment may be having effects, even if not felt immediately.

Mr. S., thirty-three years of age, inherited a feeble nervous system, had always been rather delicate, and suffered from a lame back. School life was tiresome to him, and when sixteen years old he went into a store, and there lifting heavy weights increased his backache. For four or five years he had suffered from a constant pain in the back of his neck, and holding out his overcoat at arm's length increased this; carrying a parcel for a short distance also aggravated it, and he had not been able to drive any for six months. A sudden jar or turning in bed, if not carefully done, would increase the pain in the neck. There was constant pain over the sacrum and coccyx, so that there were often times when he could not sit more than a few minutes. The whole spine and the muscles on each side of it were very sensitive to moderate pressure. Here the muscles were soft and delicate, less so on the rest of his body. Exacerbations of pain sometimes occurred when the patient was at rest. For eight years he had not been able to use his eyes for reading for more than a few minutes at a time, as more than this brought on headache. He had consulted oculists, who had told him that the trouble was not in his eyes. Prior to eight years before this he was subject to sick headaches. When he came to me he could attend concerts and plays if not exposed to cross lights. At times he had suffered from numbness in the region of the shoulders and neck with dizziness, at others from gastric disturbance without apparent cause, and once he had an attack of hiccough that lasted for forty-eight hours, and ether had to be administered to stop it. He had had all sorts of internal treatment and counter-irritation externally

with indifferent results. Drs. Frederick C. Shattuck and E. H. Bradford kindly referred him to me to try massage.

Mindful of how easy it would be to overdo in such a case, I began with fifteen minutes' gentle massage to the back. No discomfort resulted, and the patient slept from nine P.M. to six A.M. without waking, which was unusually well for him. Three days later he had thirty minutes' massage to arms and back, and felt very nice and comfortable afterwards. On the day following he jumped on a horse-car which was in motion and jarred the back of his neck, but no more than temporary discomfort resulted. From June 6 to 21 the patient had daily massage, and with uniformly good result—the dull pain in the back of the neck, the sensitiveness of the muscles and tenderness on pressure over the spinous processes, had all greatly diminished, and the erector spinæ mass of muscles had become firmer, and the patient could take much more exercise. Sojourns at the mountains and seashore had never done this patient any good, and he had sometimes been worse at the time and afterwards.

Mrs. ——, aged sixty-five years, of large frame and fairly nourished, but with tissues flabby and deficient in tone, had always been delicate, and attained her growth rapidly when quite young. For over fifteen years before I was called to her she had suffered more than usual from insomnia; from timidity in going out alone; from being easily fatigued by exercise or conversation, though she could read and write all day when alone; from numbness radiating from the coccyx over the glutei and posterior aspect of the thighs, often so distressing that she could not sit, though there was no spinal irritation; from hyperæsthesia extending from knees to ankles; from languid digestion with occasional gastralgia and at times looseness of the bowels alternating with constipation; from relaxation of the sphincter ani with prolapse of the rectum; from too frequent desire to urinate, and also from frequent attacks of palpitation and at times irregular action of the heart not accompanied by murmurs. This lady's grandparents had suffered from gout, the only relatives who had; and many years ago she herself had suffered from stiffness and enlargement of the finger-joints so that she could not shut her hands, but she got entirely rid of this trouble by manipulation. Her large-toe joints were still sensitive and easily hurt when I was called to her in September, 1883. She then

had an occasional good night's sleep, but poor ones were the rul
She would go to sleep on retiring, but soon wake up, and then it w
difficult for her to get any more sleep that night. On manipulati
the head I felt that the tissues were more rigid on the left than o
the right side, and on inquiry I was told that when she lay awak
for several hours she became blind in the left eye, but five minut
of sleep always restored the sight.

This patient had a course of massage for three months, at firs
daily and later every other day. Improvement was apparent from
the first visit, and the final result was very satisfactory, but, of
course, complete recovery could not be expected. At first the massage was given for a number of times in the morning, and the first application relieved uncomfortable feelings in the back of the neck and soreness and tenderness of the scalp. At the end of a month the distressing numbness that radiated from the coccyx had decreased; in five weeks she would start off alone and walk half a mile without fear, and two days later she had great comfort in walking, as the sphincter ani kept well contracted, which it did not before. In two months and five days the bowels had become quite regular under massage of the abdomen, digestion improved, flatulent distention had disappeared, and urination was less frequent and less urgent. Before using massage on the abdomen lime-water and a tonic containing nux vomica were tried, but did not seem to have the desired result. At the end of this time, also, she could take a walk of two miles alone, and had entirely lost that timidity which made her afraid to go anywhere unaccompanied. Her skin and muscles were warmer and suppler and she had gained in flesh. At this time the numbness over the hips and thighs made a sudden and striking disappearance after one very vigorous treatment of kneading, pinching, and percussing. The hyperæsthesia below the knees remained unchanged. After each massage the previous weak and irregular action of the heart became strong, steady, and regular. We tried digitalis and later arsenic, and the heart responded promptly to each, but its increased vigor caused by these was so distressing to the patient, who was conscious of its every beat, that they had to be abandoned. These invigorated the heart's action so that it was out of harmony with the lack of tone in other organs. Two months and a half after massage was discontinued this patient still held her improvement, notwithstanding an occasional wakeful

night and at times a slight increase of numbness. Two or three times since, when apparently she had relapsed, the relief from a few applications of massage brought her back to her much-improved condition. This brings me to say that when troubles which have been benefited by massage return, they are much more susceptible to its influence upon its renewal.

This patient never had any children nor suffered from uterine affection. She had no troubles of any kind external to herself, but at times before I attended her the distress of mind was so great that she thinks she would have gone insane but for the comfort and support of religion. Massage had to be varied in quality, quantity, and time of application to meet the requirements of this case. For a while it did well in the morning, then its effect would become lost, and we would change the time to the evening with good result. Manipulation of the head and back was most usually employed, and sometimes percussion of these regions was added, and these procedures were varied with manipulation, passive and resistive movements of arms and legs. She is still alive at the age of eighty-three and in the enjoyment of good health and all her faculties.

A case formerly under my observation was that of a lady whose only two bright little children died two years before. She had since been in great distress of mind and prostrated in body, and her sleep had been long, heavy, and not refreshing. She had general massage every other day for two months, and for the last month her sleep had been more brief and natural, she could exercise more out of doors, was in better spirits, and took food with a relish.

Much of the impenetrable mystery that has long surrounded the nature and treatment of insanity passes away when viewed from the sensible stand-point of Dr. Edward Cowles, superintendent of the McLean Hospital. He writes me that "in many cases of insanity the depression, melancholy, etc., are but the outcome of neurasthenic conditions indicating the need of rest and improved nutrition as thoroughly as in persons not insane. I think massage is of great value in the treatment of the insane, and the indications for it are the same as in ordinary cases of neurasthenia, except that mental conditions sometimes modify or forbid its use." He is of the opinion that no mental disease destroys all normal mental action, and that the problems of mental therapeutics are to encourage all normal mental activity while correcting or discouraging all

morbid activity. This is the same principle that I have applied to the treatment of impaired motion for many years. The law of progress is from the general to the special, and to Drs. Cowles and Page more than to any others are we indebted for the valuable information *that rest and seclusion are more likely to aggravate than to benefit cases of mental depression.* Dr. W. S. Playfair, of London, suspected that such was the case after a short trial of these means, and so expressed himself in the *Lancet* of December, 1881; but sufficient confirmatory evidence was wanting until Dr. Cowles's report for 1882 appeared, and the same testimony was again given in Dr. Page's report for 1883.

Symptoms akin to those found in locomotor ataxia may be got rid of by means of massage, as the following case tends to show: Mr. P. H., forty-six years of age, of slight, wiry frame, active and enduring, for several months before I was called to him had suffered from weakness, numbness, feelings of constriction and incoördination of his legs, and was unable to stand on one leg and put on his sock as formerly. These symptoms all disappeared after seven massages in three weeks, following which he took a two weeks' vacation, and after that he continued well for a year, walking to and from his place of business, a mile and a half each way, besides being about on his feet nearly all the time. At the end of a year the same symptoms returned, but to a less degree, and they were accompanied with sweating of the legs to an unusual amount. His family physician gave him atropia, which he took for only a short time. I gave the legs massage eighteen times in seven weeks, and the muscles gained in size, tone, and firmness. For twenty months he continued well and active and was on his legs all day.

In this case control over the bladder and tendon reflex were normal, but there was a little unusual urgency when called to empty the rectum.

The following four cases were kindly referred to me by Dr. S. Weir Mitchell. The first was a clergyman, thirty-five years of age, who when a child had frequent attacks of rheumatism. His duties as a pastor had been arduous, but he was not aware of unusual exertion or fatigue until he broke down, five years before I saw him. The neurasthenic symptoms were about equally divided between cerebration and motion, and developed in two or three days. Rest, travel, and tonics had been tried without result. When called to

him he could take short walks to the total extent of three miles a day, and slight efforts at using his brain fatigued him. He then weighed one hundred and sixty pounds, fifteen more than his usual weight. The treatment prescribed was milk and cod-liver oil in abundance, a tonic of iron and strychnia, an hour and a half of absolute rest three times daily, and general massage once a day. Massage made him luxuriously and agreeably tired, so that he slept like a baby afterwards, and this ought to have been beneficial, for he had suffered from dull headache with uneasy mental and bodily tension, restless nights, and spinal irritation. This treatment was kept up for five weeks and a half, and the patient gained twelve and a half pounds, and though he slept better and spinal tenderness had disappeared, he was more easily tired at the end of this time than he was at the beginning of it. During this time the correction of astigmatism was not of such marked advantage to him as would have been supposed. Once while I was attending him he suffered from more than usual headache for a week, which disappeared suddenly coincident with an attack of muscular rheumatism in the shoulder. Both were temporarily relieved by massage. In twelve days after massage was discontinued the patient was much stronger. This case received but little benefit from massage, and perhaps he would have been better without it.

The next three cases were vigorous young men who could exercise freely in the open air and walk half a dozen miles at a stretch, but who had not been able to use their brains in continued study for several years. They had massage from four to eight weeks without improvement. Indeed, this treatment at times seemed to make them irritable and hyperæsthetic. In these cases it is not unlikely that the mischief was kept up by the injurious effects of long-continued overfilling of the cerebral vessels, resulting in their enlargement and loss of contractility. These changes once developed, it is difficult to overcome them. Muscular exercise and cold to the head would be indicated.

A gentleman about forty years of age, strong in his arms and body, but always so weak in his legs that he could not walk more than a square, was sent to me for a course of massage, half-hour applications to be given him. Five *séances* in three weeks aggravated the weakness of his legs and used him up generally. If the length of the massage had been left to me, I should probably have

begun with fifteen minutes in all. In 1870 a vigorous man in the i[illegible] cipient stages of locomotor ataxia was sent to me for massage. H[illegible] was given daily massage for three-quarters of an hour, and at the en[illegible] of a week he visited his physician, who, without waiting to questio[illegible] him, at once pronounced his walking better. "Yes," said the p[illegible] tient, "I have had three times as much massage as you told me [illegible] have!" Not long after this, this same physician was prescribi[illegible]

FIG. 36.

From a photograph. Shows the condition of the patient before Dr. Playfair began to treat him with massage.

FIG. 37.

From a photograph. Shows the patient's condition after eight weeks of massage and feeding.

(From "Disorders of Digestion," by Dr. T. Lauder Brunton.)

massage by the hour, and soon many other physicians were following his example.

Dr. T. Lauder Brunton had a patient who at one time was a tall, powerful man, of active habits in the open air. Some time previously he had suffered from asthma, which had left him, and he became liable to attacks of pain and vomiting. The case was thought

to be one of neurotic dyspepsia, and for two years he became more and more emaciated, until he had the appearance of a living skeleton, in spite of all medical treatment. Only once before had Dr. Brunton seen a man so thin, and that was at a show. Under massage and forced feeding his muscles enlarged, so that he might have joined a Highland regiment and worn a kilt without being ashamed. From being a skeleton he became a well-developed man in the course of a couple of months. (See Figs. 36 and 37.)

MASSAGE IN DIABETES.

For the weakness and neurasthenia attendant upon *diabetes mellitus* massage and exercise short of fatigue have, of late, been highly recommended for no other reason than that the patient is benefited. Activity lessens the amount of glycogen in the muscles. The transformation of glycogen may be one source of muscular power. Diabetes occurs most frequently in those who lead sedentary lives, and it is often associated with hyperæmia of the liver and kidneys. Exercise and massage would therefore be rationally indicated to make more blood go through the muscles and external tissues, so as to relieve the congestion of these internal organs. But, of course, attention to diet would be of primary importance.

Professor Finkler, of Bonn, has tried general muscle-kneading in fourteen cases of diabetes. The patients were at first *masséed* once daily, and, later, morning and evening, for twenty minutes, over all the muscles of their bodies. The diet at the same time was mixed. A few of the patients were confined to bed, others were able to go about, and some did severe manual labor. The result on the whole was favorable, as shown by decrease in the quantity of urine and of the sugar contained in the same, diminution of thirst, return of perspiration, and increase of body-weight. After three months' treatment of one patient the sugar entirely disappeared from the urine, and this remained absent for three months after the last massage, then the sugar reappeared.*

Zimmer has pointed out that well-developed muscles, even when at rest, are capable of disposing of much more sugar than feeble muscles. As diabetes often occurs in fat people with feeble mus-

* Schmidt's Jahrbücher, Bd. 213, p. 218.

cles who cannot exercise, massage in such cases would be all the more necessary.

In this connection it seems of great significance that a temporary diabetic condition may be induced by anything which hastens the circulation through the liver or increases its supply of blood. Observers have met with this result from a variety of causes, but that which particularly interests us is that Bernard found that in dogs the venous blood may have traces of glucose after the abdomen has been subjected to severe pressure or manipulation over the region of the liver, and after continued struggles or convulsive action by which the abdominal organs have been forcibly compressed. A saccharine condition of the urine has also been observed in man after a bruise in the right hypochondriac region. In various animals Schiff found that compression of the abdominal aorta for ten minutes, or tying the principal blood-vessels of one limb, might induce a temporary condition of diabetes by accelerating the hepatic circulation.

The simultaneous use of massage while the patients are being douched is the characteristic mode of treatment of diabetes at Aix-les-Bains. The hydrosulphurated thermal waters of Aix are too feebly mineralized to be employed in any other way than externally, which is thought to favor the absorption of sulphuretted hydrogen by the skin. Dr. Forestier has treated seven cases of saccharine diabetes in fat people by means of the douche-massage with the result that there has been in all a great decrease in the glycosuria. Meantime these patients lived *à la table d'hôte,* eating a mixed diet of meats, sweets, fruits, and amylaceous substances, with *liqueurs* after the repast, and followed their ordinary habits as to exercise.*

The douche-massage was given while the patients were sitting or lying by two *masseurs*, one of whom took the limbs, the other the trunk, each directing a jet of water from a *nozzle* under his arm, douching and *masséeing* at the same time for ten or fifteen minutes daily, the water being at from 37° to 40° Centigrade (about 100° F.).

The patients thus treated were classified as belonging to the form of saccharine diabetes called *diabète gros* by Lancereaux, by

* Archives Générales de Médécine, September, 1891.

the English slow diabetes. All seven presented the strictest analogies and fundamental characteristics of *diabète gros:* age fifty to sixty, *embonpoint* or confirmed obesity, great thirst, voidance of large quantities of urine, and muscular fatigue. These symptoms were overshadowed in four cases by the existence of arthropathies, and in two by neuralgia, which had been mistaken for chronic rheumatism, and in one of the latter this diabetic neuralgia seemed like that of tabes, affecting the crural and sciatic nerves.

Under the douche-massage treatment the decrease of sugar in the urine was great: in the first case from twenty-four grammes in twenty-four hours, to 1.80 grammes after the twentieth massage in twenty days; in the second case, from one hundred and seventeen grammes to sixty-six grammes after the twenty-fifth massage in twenty-five days; in the third, from eighty-seven grammes to eighteen grammes after twenty massages in twenty-two days; in the fourth, from three hundred and nineteen grammes to one hundred and one grammes after nineteen massages in nineteen days; in the fifth, from forty-two grammes to five grammes after twenty massages; in the sixth, from 30.75 grammes to 11.40 grammes after twenty massages in twenty-four days; in the seventh, from two hundred and ninety-one grammes to eighty grammes after twelve massages in twelve days.

The quantity of urine and frequency of micturition also diminished. The proportion of urea to nitrogen was considered the coefficient of oxidation. This at first was somewhat less than normal, but gradually increased, showing an augmentation in the intensity of oxidation and an acceleration of retarded nutrition. This was the case in those presenting a large quantity of sugar as well as those with less. The variations of the uric acid were identical in five cases—increasing considerably and finally falling below its primitive figure. Phosphoric acid, which was present in large quantity before the treatment, gradually decreased. The general conditions of the patients were much improved; appetite and digestion were better, sleep more refreshing, muscular fatigue dispelled. The pains and stiffness of the joints were greatly benefited, but the neuralgia which affected the crural and sciatic nerves in one patient was still troublesome, though the general condition had become excellent.

The douche-massage is regarded by Dr. Forestier as one of the

most powerful measures of hygienic therapeutics for fat diabetics and can be used at the same time with other treatment, such as the internal administration of the mineral waters of Carlsbad and Vichy and Brides. But these are probably better suited for diabetics with voluminous livers and hepatic troubles, whereas the hygienic treatment by the douche-massage seems rather indicated in cases of diabetes where there is no appreciable trouble with the liver, and where the general condition alone is at fault.

The results in Dr. Forestier's cases would probably have been still more favorable if the diet had been restricted and sweets and starches omitted; but in order to put the massage treatment to the severest test a full mixed diet was allowed. This might do when the physician is obliged to have recourse to more mild treatment than that of special regimen in order not to discourage the patient.

As to the duration of improvement after the discontinuance of treatment but little is said except in two cases. In the one that had three hundred and nineteen grammes of sugar in twenty-four hours, and in whom it decreased to one hundred and one grammes after nineteen massages, at the end of eight months and modified diet at home this had still more decreased to two grammes in twenty-four hours. The following year this patient went to Vichy, and two years after he left there the urine showed fifty-three grammes of sugar in twenty-four hours. In another case which had been at Vichy for several years previously the glycosuria had always increased to the same extent (forty to fifty grammes) in the intervals between his sojourns there. Under twenty massages it decreased from forty-two to 5.40 grammes, but whether it staid so or changed we are not told. But massage would probably have had the same effect without the douche of the Aix-les-Bains water, except so far as the cleansing effect was concerned. This is simply another illustration that every substance capable of being rubbed on the human body has had wonderful virtues ascribed to it, and it must be that which is common to them all that does the good—namely, the rubbing.

FIG. 38.—"The Aix Douche-Massage."

VII.

Local Massage for Local Neurasthenia.

"I fear too much rubbing: good-night, my good owl."—*Love's Labor Lost.*

NEURASTHENIA, as I understand it, may be either general or local, affecting the nerves or nerve-cells of all or any part of the cerebro-spinal or sympathetic system. Its manifestations are those of exhaustion or too easy exhaustibility of nerve-force; and its pathology, malnutrition of the nerve-cells involved, with concomitant instability of their circulation in the form of anæmia or hyperæmia, or alternations of these. It predisposes to, it accompanies, it results from, disease; the nervous shock and the tedious recovery from injuries point to other sources, and it may be caused by overwork, worry, or sheer laziness. The agreeable fatigue after a satisfactory day's work that insures sound sleep may be regarded as a healthy form of neurasthenia, if the Hibernicism may be pardoned.

It is a matter of common observation that those who are compelled to hard manual labor seldom suffer from nervous prostration; and amongst the more fortunate who may be predisposed to neurasthenia those who are deeply interested in some hobby or occupation that keeps mind and body active have found the best means of prophylaxis. The same means that serves for its prevention also supplies us with a clew to one of the most valuable agents that can be employed for its relief or recovery. Exercise keeps the circulation active, but requires effort of brain, spinal cord, and nerves, as well as muscles, at a time when our object may be to afford rest to one or all of these parts of an overtaxed nervous system. Massage supplies this want, and will keep the circulation going with a minimum or no expenditure of nerve-force from the patient; and deep massage without friction will lessen the beats of the heart and afford it rest also. Nay, more, for it is getting to be the fashion not only amongst the laity, but also with some physicians, to say that massage imparts energy to the patient, though I confess I do not exactly understand what this means. Certainly, many who submit to massage feel much more vigorous, light, and

supple after even the first application than they did before it. But may not this rather be owing to the rousing of their latent energies, and restoring the equilibrium of their forces, by facilitating the circulation of blood, the flow of lymph, and the transmission of nerve-force?

I have previously stated elsewhere that in cerebral exhaustion the relative value of massage was almost nil, and that out-of-door exercise was of paramount importance; but I have since found reason to modify this in favor of more massage and less exercise. In such cases massage of the head alone daily or every other day is better than applying it all over the patient, unless there be a rare idiosyncrasy that will not allow the head to be manipulated.

There are people, not a few, who, when using their brains, suffer from uneasy sensations in their lumbar or dorsal region, and these discomforts continue after the cessation of study, causing wakefulness. Generally there is also some spinal irritation in the region affected. In such cases massage of the back alone will often induce sound sleep, and next day the patient feels inspired with faith, hope, and courage, in place of doubt, dread, and fear of meeting appointments. With these cases a much more marked effect is produced by local than by general massage, except when the tenderness of the muscles and spinal irritation is extreme, unfitting them for every kind of work, and then the massage should be general, omitting the back at the first *séances,* but gradually approaching it at subsequent ones.

In other cases of what may be called local neurasthenia, if the term can be allowed for this purpose, such as writer's cramp, or the cold, small, and feeble muscles resulting from injury, disease, or disuse, massage and exercise, carefully adapted, have given excellent results. To these have recently been added another affection, —namely, laryngeal cramp of musicians and speakers,—for the local treatment of which electricity and massage are considered the most effectual measures.

It will doubtless be a revelation to many to experience either in their own heads or to observe in those of their patients the light, comfortable, delightful feelings that are produced by the resistance of a skilled manipulator to forward, backward, and lateral movements of the head. The impression is that the interior of the head has been benefited, and the effect is hardly secondary to massage,

which rather gives the impression that the exterior has been improved.

The following cases seem to me sufficiently worthy of notice as examples of the conditions mentioned:

CASE I. A. J., twenty-three years of age. Three years prior to my being called to him he had been winning races at college at the same time that the functions of his brain flagged, and study had become so irksome, producing headache and insomnia, that he gave it up for a year. At the end of that time he returned to college for a year, and, to use his own words, "patched up and graduated," and for the year before I saw him he had been trying to recuperate by resting at home. At this time even walking sometimes produced discomfort in his head. At my first visit he had been suffering from headache, with tolerably acute pains in the external branches of the fifth pair of nerves, and had had but little sleep for four nights. The immediate cause of this had been too much conversation with friends on the evening of a holiday. Massage of twenty minutes to the head alone, in the evening, almost completely relieved the headache and neuralgic pains, and was followed by an excellent night's sleep. After this, massage of the head with resistive movements to the muscles of the neck was repeated seventeen times in twenty-four days, and the improvement in sleep, in comfort of the head, and in the power of using his mental faculties was so great that it became a serious question whether he should not abandon a six months' sea-voyage that he had determined on. Marks of improvement that may be mentioned were: that when he had an occasional wakeful night he felt no worse on the following day; he had none of his former anxiety in taking charge of his class in Sunday-school; he attended a large party late one night without any after-effects, and he walked about freely, and all while he was preparing for an absence from home of six months or a year. Medicine had been laid aside before massage was tried in this case.

CASE II. Rev. D. L., aged sixty-six years, has a good appetite and is well nourished, weighing about one hundred and eighty pounds. For twelve years he had suffered much from wakefulness. He required from eight to nine hours of sleep, but seldom got more than five or six hours of broken, unrefreshing slumber. At times he would fall asleep soon after retiring, to wake up in a short time; at others he would lie awake for hours before getting to sleep.

Besides discomfort about the head, he had still more distressing dull aches and uneasy sensations in the lumbar region, aggravated by study or wakefulness.

He found some relief from giving up his ministerial duties ten years before I saw him. He came to me on January 25 of this year, and after thirty-five minutes of massage on his head and back at noontime he passed the remainder of the day in comfort, and that night and the following had seven hours of sleep each, so that when he came to me on the second day after massage he was hopeful and radiant. Massage was repeated at eleven A.M. on head and back with increase of comfort to the patient. He did not sleep so well the following night as he did the two preceding nights, but he realized that he was quiet and serene, and felt that he was resting, and next day was refreshed. This day he had a refreshing sleep of an hour and a half in the afternoon, which he never could obtain when well, and that night slept steadily for seven or eight hours. This patient had massage three times weekly at or near noon for seven or eight weeks, and the result of the first week is a fair average of the succeeding weeks: five good nights of sleep out of six, with a nap of an hour or two in the afternoon; and when wakeful he felt that he was resting, and the following day was not miserable from loss of sleep, as before massage; vigor of body and mind gradually increased, and he could take part in lectures, sociables, and other evening entertainments without loss of sleep, as formerly. Mild tonics and stimulants always made this patient worse. An epiphora that had troubled him for many years disappeared under massage of the eyelids.

CASE III. Mr. E. B., thirty-five years of age, had been in good health for several years, and attended to his business, which involved great detail, from nine A.M. to six P.M., with an hour off at noon for lunch. He had remained in the city all the previous summer, and felt very well when he went away for a vacation of several weeks to Colorado, returning on November 20. From the time of his return he began to suffer from headache, which caused him to be out of his office several hours daily; and by the end of three weeks this became suddenly so much worse that he was obliged to leave his office altogether. There was a slight elevation of temperature, but still he had a good appetite and slept well. I gave him massage of the head on three successive days, and the headache was relieved

only while the head was being manipulated and for a short time afterwards. When massage was being done on the right side of the head the ache would disappear and increase on the left side; and on doing both sides they were relieved, and the ache increased in the back of the head; and on *masséing* the back of the head the discomfort would disappear from there and increase in the forehead, and on manipulating this region it would disappear altogether for a time. In other cases I have chased pain in this way all over the patients without being able to dislodge it completely, only temporary relief being afforded at the place of application.

Case IV. will serve to show still further that it is not always well for those who are inclined to nervous exhaustion to give up their employment when working easily and go away on a vacation. Miss M. P., thirty-four years of age, teacher in a High School, had been subject to headaches all her life. Her parents had highly nervous temperaments. One year before I first saw her the headache had been so severe that she was confined to bed for seven days with pains all over her and elevated temperature, and since then the headaches have been more frequent and more severe than before, and usually accompanied with nausea and vomiting. Evidently the case was one of migraine. The ache was on the left side of the head, in the left eye, and more especially over the left temporoparietal region, accompanied with a crawling sensation at the back of the head and soreness of the muscles of the back of the neck. The left side of the face was smaller than the right. She had great weariness and weakness in her arms, so that it tired her even to raise them. In the cervical and upper dorsal region there was much tenderness on pressure over the spinous processes. Her appetite was good, bowels regular, and she slept well. Notwithstanding the increase in frequency and severity of headaches for a year, she had gained in weight, mainly adipose, so that she weighed one hundred and sixty pounds, her ordinary weight being one hundred and twenty-three pounds. She continued her duties as a teacher, and found that she felt better when occupied in this way than when not feeling compelled to do anything. Saturdays and Sundays were her poorest days, and a vacation of two months in the South ten months before she came to me was of no apparent benefit to her, but, she thought, made it all the harder for her to begin her professional duties again. Correcting examination-papers fatigued her more

than anything else. She could walk three or four miles with ease.

The first massage of thirty minutes on the head alone left this region "perfectly comfortable" until the second massage was repeated, two days later, when this comfort was extended to the manipulated regions—head, neck, arms, and shoulders—and a burning sensation between the shoulders was also relieved. In four weeks a continual wooden, numb sensation of the left side of the head was not only relieved temporarily, but did not return; and, corresponding objectively to this, her tough, indurated scalp had become soft and supple. Sixteen days after she came to me she could not stand and read on account of weak and uneasy sensations in the back of her neck, as if her head would drop backward when she attempted to hold the book, but she could sit and read with ease. This was at the catamenial period, when she was generally worse in every way. But two days later she was much surprised to find that she had recuperated more quickly and to a greater extent than ever before. This patient had massage twenty-five times in ten weeks, with increasing improvement, and this continued after treatment was omitted, so that she was practically well—sufficiently well to enjoy her summer vacation, which helped to confirm the benefit previously received. Six months later she reported that she had continued quite well. The following spring her troubles returned in the same way, but less severely than formerly. They were speedily removed by massage and stayed away for a year, when, again, there was a slight relapse, and more speedy recovery under massage. At times she had found nux vomica more beneficial than any other internal remedy, but even this had lost its effect before massage was tried.

Case V. Mr. J. B., aged thirty-three years, has always been a nervous man. He always felt fatigue in the lumbar region, but this he regarded as a matter of course, and he was always capable at business until six years before I first saw him. At that time he was in an elevator which was being tested against sudden falling by means of some "sure patent preventive." The experiment failed, and the elevator fell eighty feet with six men in it. While descending our patient sat as tailors do, hoping thereby to diminish the shock of stopping. He got out apparently none the worse, walked four squares to his newspaper office, for he was then an editor, and

dictated an account of the accident. He stayed at home for five or six weeks, but was not confined to bed. After this he resumed his duties, but it was eight months before he could walk a mile. For a long time in the evening the region of the spine was painful, but relief was often found by pouring cold water upon it, at other times from very warm water. During vacation he was perfectly well and played lawn-tennis. For three weeks before I saw him he had suffered from pain in his back and legs and could walk but a very short distance at a time. Conversation and reading quickly tired him, and part of either would escape his attention. A few hours at business would cause nausea and headache and make him feel generally used up. Appetite, bowels, and sleep were in a normal condition.

At my first interview there was much tenderness on pressure over the spinous processes and muscles of the back, but after three massages in nine days they could be manipulated quite vigorously. After six massages in eighteen days he was practically as well as ever. Manipulation was exceedingly agreeable to this patient, and while it was being done on either leg or hip the agreeable sensation was felt in the back and in the other leg and hip, as well as at the seat of application. About once a year, usually in fall, after his vacation, this patient finds himself used up, as just described, and he has learned by experience to rely on the prompt relief afforded by massage. He has also found wine of coca of some use. I have frequently made similar cases worse by using massage too vigorously to begin with.

Case VI. When Mrs. M. W. came to me in October, 1884, she was fifty-eight years of age, and weighed two hundred and thirteen and one-half pounds. Her adipose tissue was supple and of good consistency. She had then been suffering for three years from a continual distressing feeling of weakness in the right leg and thigh, which first made its appearance when there was some enlargement of the internal saphenous vein, but this had long ago disappeared. On examination the whole limb seemed normal in every respect. The patient was not at all of a nervous, hysterical, or imaginative temperament, having been at the bombardment of Fort Sumter, once in a steamboat explosion, and once made a long voyage in a vessel with the cargo shifted, so that there was imminent danger of the vessel upsetting, besides having travelled twice

round the world, on one of these occasions taking command of a vessel for four weeks amidst shoals and breakers in the China Sea.

A walk of a square was as far as the patient could go with comfort, and a walk of one-fourth of a mile caused great fatigue and increased the feeling of weakness. She had tried absolute rest for one, two, and three months at a time, during which she lost flesh, but the limb did not improve. At my request she omitted potatoes, sugar, and butter from her diet, and began walking for two minutes every hour during the day, which was increased daily one minute every hour. Massage was given to the leg, thigh, and hip three times weekly. The first time it comforted and rested the limb, and after this passive and resistive movements were also given, which at first tired the limb, but this was at once counteracted by manipulation. At the end of two weeks she could walk half a mile without fatigue,—twice as far as she could before with great fatigue,—and a distressing pain that previously came after slight exertion at the exit of the sciatic nerve had not been felt for a week. At the expiration of four weeks the patient walked a mile and a half with ease, feeling but slight general fatigue thereafter, and the limb that had been weak was not so tired as the other. It was by her own wish that massage was repeated occasionally for a few weeks longer, and she has continued well ever since. Under the restricted diet she lost seven and a half pounds, and no doubt this aided her recovery.

Case VII. Miss E. H. was thirty-nine years of age when I attended her in the winter of 1883-84. She is irregularly astigmatic, and suffers from headache, and this is worse at the menstrual period, which recurs every three weeks and a half, accompanied with pain. She suffers much at times from indigestion. She is a lady with a strong mind, a clear intellect, an unwearied conversationalist, and, in the language of her physician, who sent her to me, "she is a preëminently hyperæsthetic subject, and would be hysterical, did not the brain govern the *cerebrum abdominale*." For five years she had suffered with pain in her right knee, impairing locomotion, and the latter part of this time there was pain also in the outer and posterior aspects of the thigh, where the muscles were considerably atrophied—so much so that her other discomforts seemed small in comparison with those of the limb. The trouble

in the limb came when she was run down from nursing a sick relative, and, coincident with this, a severe cough that had been increasing every winter disappeared and did not return. During these five years under rest, with and without fixed dressings, changes to country and seashore, the use of tonics and sedatives internally, and blisters externally, there would be sometimes a little improvement in the knee, but always followed by speedy relapse on slight or no provocation, such as accidentally hitting it against something or being obliged to use it a little more than usual. At times the pain was relieved by walking, at others made worse. It was aggravated by cold weather and by riding in a carriage.

Examination showed that the affected limb was much smaller than the other, the skin cold and dry, the muscles atrophied, but there was nothing especially noticeable about the knee, save slight puffiness and great tenderness on pressure upon the internal condyle, not in the skin. Owing to pain and weakness, which were aggravated by walking, she could take but a few steps when massage was begun, and the only symptom then in her favor was steady sleep. Massage was applied three times a week for eleven weeks and a half, being omitted for a few days at one time on account of unusual pain in back, stomach, and intestines. For the first four weeks massage, with gradually increasing exercises, was confined to the affected limb, with the result that she was at the end of this time taking four walks daily of ten minutes each, besides exercises of standing on tiptoe, stepping up two steps at once, holding the limb out extended, and elevating it sideways when lying down. From the first the skin became warmer, softer, and suppler, and the muscles fuller, as shown by an increase of one-half inch around the calf, one-fourth inch at the knee, one-eighth inch three inches above the patella, and one-fourth inch seven inches above the patella. When treatment was discontinued these gains were one-half inch, five-eighths, three-eighths, and seven-sixteenths respectively. But at the end of four weeks the pain was still about the same, notwithstanding the improvement in locomotion, nor had it entirely disappeared when massage was given up.

As soon as she made known the head and abdominal troubles massage was applied for ten minutes to each of these regions also, which was during the last seven weeks of treatment. Headache was lessened, sleep became more refreshing, digestion easier.

During the last eight or ten days of treatment it became evident that, though the patient was much better and could go about much more freely on foot and in a carriage, she had come to a stand-still, and consequently the treatment was terminated rather sooner than she wished. A year later I saw her and she was the picture of health. Her appetite was enormous and digestion good. She had gained many pounds in weight and could walk freely, but still suffered from headache. She considered, and I think rightly, that massage had given her a start, and improvement had continued since it was omitted, for no other treatment had been used.

Amongst people who may be considered perfectly well there are few, if any, who have not some weak points. When fatigued or worried I suffer from tension and dull ache throughout my whole right side. In September, 1884, when in Paris, I had one man give me half-an-hour's massage on my right side only at two P.M., and another half-an-hour's massage on the same side at five P.M. The manipulation was slight, superficial, and rapid, and at the time of its being done seemed very ineffectual. But that night I never slept so sound in a railroad-train in all my life as I did from Paris to Calais, and while crossing the channel I was not even sick. Two days later I played deck quoits all one afternoon when the thermometer was eighty degrees in the shade and the ship rolling. Next morning my playmates could scarcely get out of their berths, they were so stiff and tired, and so was I, but the fatigue was all confined to my left side, and not to the right, as formerly.

It may be said that these were not very sick people, but they are cases that prove troublesome to physicians, and they were certainly in conditions which any one of us would gladly be freed from. It is not necessary that I should dwell here upon extreme cases of nervous prostration that have been treated by absolute rest, forced feeding, massage, and electricity. I could give further details of the above-mentioned cases, and also of similar ones, which would seem to justify the following conclusions:

1. That massage induces sleep.

2. That even when massage is applied in the forenoon its soporific effects may not disappear before bedtime; though in general the later in the day massage is used for promoting sleep the better.

3. Disagreeable feelings of drowsiness and languor do not necessarily intervene between massage in the forenoon and sound sleep

at bedtime. Aptitude for rest or work generally follows massage. The mind is clearer, the mental faculties work easier and longer, the muscles are suppler and do not tire so soon.

4. When people are wakeful after massage they may not be restless nor feel the loss of sleep on the following day.

5. Spinal irritation is relieved or disappears under massage.

6. For local neurasthenia there is no need of general massage, unless the whole system be secondarily affected.

7. When affections have come to a stand-still under massage, improvement may yet go on after massage has been discontinued and without any suggestion to that effect.

8. For improving the nutrition of nerves and muscles, restoring natural sensation and motion, massage may succeed when other means have failed.

9. Deep massage without friction has proved of more value in my hands than all other forms of massage put together in the cases herein considered.

10. Massage can be overdone, producing opposite effects from a moderate application.

11. Besides massage, carefully graduated exercises at regular times are valuable accessories in the restoration of motion.

12. Massage is not the only means of treatment for neurasthenia. Its selection is usually decided upon after the failure or exhaustion of every other means, in the same manner that the shrewd old divine decided that it was not wise to let the devil have all the good tunes to himself.

VIII.

Neurons: Their Relations to Therapeutics, Medical and Mechanical.

"That part of our nature which lies half-way between the body and the spirit and partakes of the nature of both: the nervous system."

THE minute anatomy of the nervous system has been so carefully studied of late years, and the theory of its functions has changed so rapidly, that but few of us older fellows have been able to alter the views that were so positively taught twenty-five years ago. And, indeed, among modern students of the nervous system its nomenclature, structure, and functions are not by any means uniform, indicating either difference of opinion or carelessness of study.

For our present purpose it will be sufficient to recall a few of the recent and most generally accepted investigations in this field. The neuron consists of the nerve-cell and its branches; the latter are one or two axis-cylinders called neuraxons, and from these proceed side branches called collaterals, which end in tufts of fibrils called terminal arborizations. These terminals communicate with the shorter and more numerous processes of the cell, the dendrites or dendrons, so called from their tree-like appearance. The axis-cylinders and their collaterals form the nerve-fibres, and their function seems to be to convey impulses from their cells through their terminal arborizations to the dendrites of other cells which receive the impressions. For a long time physiologists firmly believed or taught that the processes of nerve-cells acted by *continuity*, but more recent researches indicate that they act by *contiguity*, and not by continuity at all. But it is difficult to conceive how this can be unless the nerve-cells and their processes are surrounded by a fluid medium. The neuroglia-cells form an insulating material between the nerve-cells, and must either be active or passive when the neurons are in contact or not in contact. According to the most authoritative histologists, the neuroglia-cells are passive, but a very distinguished one, a Spaniard—Ramon y Cajal—is of the opinion that the neuroglia-cells are the active agents, and that when they are

relaxed their processes penetrate between the dendrites and terminal arborizations of the nerve-cells and hinder the transmission of nerve-currents. When the processes of the neuroglia-cells are retracted, then the nerve-cell projections are allowed to come in contact. The neuroglia-cell processes have numerous short arborescent collaterals, and Cajal thinks he has observed two phases of them: one, that of contraction when the cell-body augments, while the processes shorten and the branches disappear; the other, that of relaxation when the processes of the neuroglia-cells are elongated. Hence it might appear that the movement on the part of neurons is a passive one, depending upon the interposition of the insulating material. It is more than likely that the activity of the neuron has been mistaken for that of the neuroglia.

Be that as it may, it seems to be now pretty unanimously conceded that nerve-cells and their processes (neurons) are distinct and separate from each other, and, therefore, the theory that they somehow act upon each other by contiguity and not by continuity would seem to have some foundation in fact. In health, when free from fatigue, these nerve-cell projections are supposed to come into contact with each other and form various combinations of thought and action, and the machinery of life goes on when the cog-wheels connect, so to speak. Having reached the limits of fatigue, their terminal arborizations and dendrites no longer come in contact by interlocking, overlapping, or however it may be, but recede from each other, and we have in the brain sleep, in the muscles relaxation, until rest brings them back to a normal condition, removes their waste products, and supplies them with nourishment, when they are again ready to respond by contact to appropriate stimuli. When we have disturbance, functional or organic, then the proper combinations of cells no longer connect for the performance of healthy voluntary or involuntary functions.

Hypnotism has been invoked to throw light upon this interesting subject.* The state of lethargy and relaxation induced thereby would be explained by the retraction of the neurons in the brain so that their terminals do not connect or articulate with the dendrites of the neurons in the spinal cord. Catalepsy would then be due to too close contact of the same, manifesting itself by an increase of

* Dercum, American Journal of the Medical Sciences, August, 1896.

muscular tone; somnambulism by the combination of certain neurons whilst others are retracted in sleep, and the sudden disappearance of hysterical paralysis by a removal of contact of the various nerve-cell combinations at fault.

The behavior of nerve-cells and their processes, theoretically, at least, would seem to be similar to that of the white blood-corpuscles in their peculiar amœboid properties. Under the microscope leucocytes anæsthetized by the absence of oxygen and the presence of carbonic acid would seem to have their pseudopods retracted. This is thought to form a basis for the histologic theory of sleep, the prolongations of the nerve-cells being retracted during sleep and expanding when awake, in dreams some being partially or wholly connected, whilst others that go to make up the conscious *ego* are still contracted in slumber. When we are profoundly absorbed in abstract thought we do not hear the ordinary sounds around us, for certain of our cerebral cells seem to have the faculty of breaking their communications, of somehow closing the door to obtrusive sensations.

Wiedersheim * observed in the Leptodera hyalina (a species of worm belonging to the nematods) that the nerve-cells were not immovable, but presented changes of form—amœboid-like movements. He studied the living neurons in the brain of this little animal, which has so transparent a skin and body that the cells of its brain can be observed while in full activity. These cells seemed to be endowed with a wonderful degree of mobility, changing their forms, protruding their ramifications, and drawing them in, as the amœba protrudes and draws in its pseudopods. The peripheral prolongations of the olfactory cells are pretty surely known to be endowed with motion, and these are quite homologous to the prolongations of the protoplasm of the neuron.

By far the most interesting, satisfactory, and conclusive evidence in favor of this captivating theory that nerve-cells and their projections act by contiguity and not continuity is that of Professor C. F. Hodge, of Clark University, Worcester, Mass. His experiments and observations, entitled "A Microscopical Study of Changes Due to Functional Activity in Nerve-Cells," are given in detail in the *Journal of Morphology* for November, 1892. It is one of *the*

* Anatomischer Anzeiger, 1890.

articles of the nineteenth century, and as the journal in which it is published is accessible to but few readers, the methods and results are here reproduced at a length that is more worthy of them than the brief manner in which they have hitherto been referred to. The spinal-root ganglia were chosen for observation. The plan was to stimulate a nerve going to one or more of these ganglia on one side of the animal, leaving the corresponding ganglia on the other side at rest for comparison. The right side was always chosen for stimulation. The stimulated nerve was never divided, so that the contraction of the muscle could indicate the healthy condition of the nerve. At the end of the desired length of time the stimulated ganglion with its mate on the other side were excised, treated alike, and put on the same slide of the microscope. The following results are from fifteen experiments on frogs and eleven on cats. As the most instructive series is in Table IX., it will be first presented. The experiments were on six cats, in which the right brachial plexus of each was stimulated by an electric current for five hours, fifteen seconds each minute. At the end of five hours the shrinkage of the nuclei was found to be 48.8 per cent. It required fully twenty-four hours of rest for the cells and nuclei to resume their natural size and appearance. The fatigue caused the interstitial substance of the cell to disappear, as shown by vacuoles and lighter granulation, while the nucleus collapsed bodily.

TABLE I.—This showed that stimulation of two and one-half hours, intervals of rest and stimulation being two minutes each, produced a shrinkage of the nuclei of twenty-four per cent.

TABLE III.—Stimulation of three and one-half hours, five stimuli every second, one minute of stimulation alternating with one minute of rest, to sciatic ganglia of right side, caused a shrinkage of thirty-six per cent.

TABLE V.—Stimulation of seven hours' duration, at intervals of one minute, in a cat caused an average shrinkage of 28.6 per cent.

To show how very carefully these observations were conducted, one hundred cells with their nuclei were measured and their mean diameter ascertained. As a result of fatigue from electrical stimulation there was seen marked decrease in the size of the nucleus, with change from a smooth and rounded outline to a jagged and irregular outline; loss of open reticular appearance, with darker

stain. The cell protoplasm showed slight shrinkage in size, vacuolation, and lessened power to stain. The cell-capsule was decreased in size.

The processes of recovery were the reverse of those of fatigue. The protoplasm seemed to recover rapidly, for at the end of six and one-half hours little or no vacuolation could be seen. The nuclei, on the other hand, recovered slowly, not being entirely completed in twenty-four hours.

The effects of normal daily fatigue on sparrows and swallows were also most carefully studied in the same article by Professor Hodge. The nerve-cells of rested birds in the morning were compared with nerve-cells of birds of the same size in the evening after they had been flying about all day. The examinations of the specimens showed a great amount of change after a day's exercise. It exceeded that obtained by artificial stimulation. The greatest per cent. of shrinkage of nuclei, 69.7 per cent., was found in the occipital cortex of a female sparrow that had been working hard all day building her nest. (What could be more interesting?) The spinal ganglion-cells of the same bird showed the next highest per cent. of shrinkage, 64.5, as an index of the amount of fatigue. The recuperation from a night's rest must be very great, and in all probability makes up this waste of nerve-cell tissue.

One of his experiments is so full of interest that I give it here in his own words: "On the morning of February 17 it began to rain and continued nearly the whole day—a steady, warm, foggy spring rain. In the dense cover of the pine-trees over my window the sparrows spent the day scolding and chattering at a great rate. None was observed flying about. At first I decided to abandon the experiment, thinking I should find little evidence of fatigue on such a day. On second thought, however, I concluded to make a rainy-day experiment of it, and see what might result. I little expected the sharp and somewhat amusing result expressed in the table. Not an observable sign of fatigue was to be seen in the spinal ganglia, while traces of fatigue were slight in the cells of Purkinje (second layer of cells in the cerebellum). Perfectly clear, however, were the marks of fatigue in the nuclei of the cerebral cortex, as though while confined by the rain the little birds had kept up a deal of thinking."

In order to show how clearly and naturally this original investi-

gator thinks and studies, I will here bring forward some of his own remarks about swallows: "Perhaps the most active bird that we have is the swallow. Quick, vigorous, powerful, careful in all its actions, it must require an enormous amount of nervous energy to coördinate its countless movements for a long summer day. There is nothing lazy or stupid about the swallow. When their work is done they play games and fly races, and with all the energy required for flying they still have enough left to do no end of talking, for their cheerful *zwitschern* is continually in my ears while I write. At one hundred miles an hour for ten hours,—and I have observed them as early as five o'clock in the morning and as late as eight in the evening,—a swallow might cover a distance of one thousand miles in a single day. If a bullet of the same weight were to traverse the same distance at the same speed, an enormous explosion of energy would be required, and the living arrow can require no less.

"At five o'clock in the morning a large male swallow was shot, and within five minutes his brain and spinal ganglia were in their proper hardening fluids. A few minutes before eight in the evening another male swallow was taken down, and by eight his brain and spinal ganglia were treated like those of his brother in the morning. Signs of fatigue were everywhere present in the parts examined, but the brains gave the most agreeable surprise. The cerebellum showed the highest per cent. of loss, nearly ten per cent. more than the cerebral cortex. To the cerebellum is ascribed the work of coördination, and where could be sought an instance of more delicate manipulation than must be required to drive the wing of a swallow as it flits and whirls and balances and wheels and darts the whole day long?"

The brains of honey-bees were also compared, and it was found that those that had been at work all day showed a shrinkage in their cells of from nine to seventy-five per cent. as compared with the brains of similar bees in the morning. Great is the recuperation from fatigue of honey-bees. The food they gather must be very nourishing and sustaining. More recent experiments by Professor Hodge, in which the brains of young animals suddenly killed showed the dendrites and contact granules uniformly expanded in rested neurons, while in fatigued ones the dendrites were contracted and varicose.

That celebrated poison, *woorara,* which the South American Indians use to poison their arrows, when injected into the human system has long been known to cause paralysis of the terminal branches and peripheral plates of the motor nerves (peripheral neurons, we must now say), so that the nerve-force no longer connects in such a way as to produce muscular contraction. This poison, according to the experiments of Drs. Hammond and Weir Mitchell, seems to act directly upon the heart, probably through the ganglia in its tissue, as well as upon the voluntary muscles. It also destroys the reflex functions of the spinal cord. Strychnine, on the other hand, is equally well known to increase the excitability of the nerve-cells in the spinal cord, manifesting itself in muscular spasm when taken in poisonous doses. In the case of woorara, it might be said that the protoplasmic processes of the nerve-cells can no longer come in contact with the projections of other nerve-cells; in the case of strychnine, that they are in too close contact and cannot let go. It is not improbable that the action of all medicines, and the different effects of the same medicine when taken in small or large doses, may be partly explained in this way by their producing an ultimate chemico-mechanical effect on the nerve-cells in different parts of the body. It is also supposable that the action of different poisons on the nervous system, whether the poisons are generated in the body itself or are introduced from the outside, may in great part be explained in the same way. Thus before long we may have a new system of therapeutics based on a new system of neuropathology.

We have all felt the lassitude of extreme fatigue, which might now be explained by saying that it is due in great measure to shrivelling of the nerve-cells, preventing contact of their projections, and most of us when young have probably suffered from cramp in our calves after a hard day's tramp, which, according to this theory, would be due to the nerve-cell processes, the terminal arborizations and the dendrites having got too closely interlocked from the irritation of waste products, showing itself in muscular spasm. That we may have from retained waste products of excessive exertion both relaxation and cramps is not without its analogy in poison introduced into the system from without. Lead, for instance, causes paralysis and relaxation of the extensors of the hands, while in the abdomen it often induces spasms, cramps, and colic. From experi-

ments in animals, Dr. Earnest Harneck * concluded that lead colic is due to intense excitation of the intestinal ganglia by the lead, producing arrest of peristalsis from spasm of the muscular coat. Shall we say that the neurons that preside over the nerves that move the extensors have their protoplasmic processes immovably retracted so that they can no longer vibrate and articulate, while those that control the intestines and abdominal walls are in too close connection, spasmodically interlocked, or ankylosed? † However this may be, strychnine is one of the remedies relied upon for the paralysis of lead after its elimination by other remedies, and perhaps it acts by bringing the neurons into better condition for normal contact. A new explanation may thus be afforded for the action of excitomotor remedies, such as strychnine, ergot, digitalis, etc.; and also, though just the opposite, for depressomotors, such as the bromides, chloral, gelsemium, conium, etc. The action of other remedial agents, internal and external, might be explained more or less in the same way.

Tea and coffee are said to stimulate the amœboid movements of protoplasm. At times they certainly aid in stimulating thought and in forming new combinations of ideas, perhaps by bringing about different relationships of the cortical neurons. Tobacco, on the other hand, by its sedative and relaxing properties seems to suit some students better in the collection of their thoughts, which, according to this theory, would be by causing relaxation of cortical neurons that had been too much preoccupied in loving embrace or close combat, and thus allowing others to form new combinations.

The effects of tonics, stimulants, and sedatives, whether of a chemical or mechanical, electrical, thermal, or dynamical nature, upon central and peripheral neurons are probably similar, simultaneous, and parallel to what they are upon voluntary and involuntary muscular fibres. Hence the state of the muscles is very likely

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* Biddle's Materia Medica.

† Dr. T. Lauder Brunton tells us that one of the most painful experiences of his life was that of being nearly tickled to death by a nurse when he was a small boy. He can never forget the agony of it. This leads him to believe the statement that Simon de Montfort, during the persecution of the Albigenses, put some of them to death by tickling the soles of their feet with a feather. The neurons may have become so tightly interlocked that they could not let go. Perhaps something of the same kind occurs in tetanus.

a good barometer of what is going on at the other ends of the nerves that supply them in brain or spinal cord. Every muscle-reader is a mind-reader, and he who has the *tactus eruditus* well developed, be he a physician or a *masseur,* has an immense advantage in the diagnosis and treatment of neuromuscular troubles. In two cases of hemiplegia recently under my observation there was much spasm (contracture) of the flexors of the hand and arm. The patients were both receiving the faradic current, which is well known to stimulate muscular contraction, and were taking strychnine internally. As soon as the faradism was stopped the spasm became less; and later, when the strychnine was left off, there was still greater improvement; the contracture almost entirely disappeared, allowing the opposing paralyzed extensors to come into play as much as they could. In these cases the effects of the strychnine and faradism might have been, and probably were, simultaneous upon central and peripheral neurons, terminal arborizations, and muscular fibres.

The effect of stimulation upon protoplasm is, when sufficiently strong, to cause an immediate cessation of movements and withdrawal of protruded processes into the main substance. Upon cessation of the stimulation, if it has not been too strong, the movements will begin again; but if so severe as to injure the living substance, they stop forever. Mechanical stimuli and abrupt changes of temperature act in like manner. It is quite conceivable that nerve-cells and their projections behave in the same way.

Recent experimental studies tend to strengthen the theory that neurons act by contiguity and not by continuity. After slight injury to the head and spinal column Lutzenberger studied the changes in the nervous system of guinea-pigs, and found that the general disorders of nutrition showed themselves most prominently in the increase of the number of ganglion-cells that presented all styles of retrogression.* Parascondola has also made an extensive study of the effects of shock upon guinea-pigs. He stretched them out flat and gave them a sharp blow upon the abdomen with a flat ruler. The animals reacted in various ways. Most of them after a period of quiet seemed to recover, but in from thirty-six to forty-eight hours they died with symptoms of exhaustion or shock. The

* Annali di Neuroglia, 1897.

cerebrum, cerebellum, medulla, and spinal cord were removed for microscopic examination. The alterations found were deformities of the cell-bodies to the extent of actual atrophy, node-like swellings on the dendrites, and fragmentation of the same. There was also found degeneration of the posterior roots, proceeding even to degeneration of the posterior columns. Changes in the cellular protoplasm were also seen—rarefaction proceeding to vacuolation in the nucleus, and vesicular swelling of the nuclear protoplasm.*

These were very serious alterations and all tend to throw light upon the nature of fatigue, shock, neurasthenia, and hysteria arising from injury. But percussion, though harmful in large doses, is often beneficial in small ones, stimulating languid nerves and muscles, and sometimes relieving painful ones by over-inciting them and wearing out their irritability, and presumably at the same time favorably influencing the vibrations and connections of nerve-terminals and dendritic processes.

It seems rather curious that those who have furnished the clearest objective evidence that nerve-cells and their projections act upon each other by contiguity and not by continuity are not the ones that have advanced this theory at all. Thus Professor Hodge, in the *Journal of Morphology* for 1892, the New York *Medical Record,* March 26, 1898, and in previous publications, says nothing of this theory, and yet he has furnished the clearest objective evidence of it. Credit is given to two Frenchmen, one, M. Lépine, for having first advanced this theory in the *Revue de Médecine* in 1894, and the other, M. Mathias Duval, for agreeing with him in the *Comptes Rendus de la Société de Biologie,* 1895. These gentlemen must have exceedingly brilliant imaginations, for they scarcely ever refer to the labors of others, and not at all to those of Professor Hodge, that would furnish them with objective evidence confirmatory of their theory. This seems to be always a rapid way of becoming famous. Their hypothesis seems to have been evolved from a single case of hysteria of a peculiar kind that suddenly passed from complete deafness to acute hearing, and which they explained by saying that " the anæsthesias, sensitive and sensorial, and the motor paralysis in the hysterical are due to imperfect contact between the ramifications of the nerve-cells;" and the disap-

* Archives de Physiologie normale et physiologique, 1898.

pearance of these morbid states is owing "to an erethism of the prolongations of the nerve-cells, by which they are brought into normal contact, attention sufficing to reëstablish the contacts."

When distinguished gentlemen like these are allowed to hold this theory on such insufficient evidence and with so little regard to the testimony of others, it behooves us to ask if this theory or something like it has not been promulgated before, for it has given these Frenchmen great renown, and neurologists are disposed to believe in it. William H. Munroe, of Boston, was a very intelligent layman who had studied anatomy and physiology to a moderate extent. He died in 1887, at the age of eighty years. For the last thirty years of his life he was firmly and enthusiastically of the opinion that somehow or other in disease the nerves did not connect properly, and "to remedy this evil" (as he used to say) and to make them connect he relied on manipulation by hand, a mode of treatment in which he became very skilful, and which, viewed from recent light, he not altogether inappropriately called the "nervous-adjustment cure." He had a large clientèle of intelligent people, most of whom were fascinated with his theory, while physicians smiled incredulously at the theory and the seeming irregularity of the practice. An association with him for three years before I studied medicine, from 1867 to 1870, convinced me of the efficacy of this treatment in disturbances of nerves, muscles, and joints, mostly of a chronic nature. From observations of massage in this country and abroad, extending over thirty years, I may, perhaps, be allowed to say that he certainly had the best single method of this art that I have yet met with. Wherever there was undue tension of the tissues, there the nerves were supposed to fail in properly connecting, and the thorough, agreeable, and efficacious manipulation of the offending region often proved beneficial; and even when it failed to do good it left behind it a pleasant impression, far different from that after the scraping, greasing, or slapping that too often passes for massage. Indeed, the word massage is becoming subject to so much abuse that perhaps such an expression as manipulation or manual treatment had better be adopted in place of it, for more depends on the skill and experience of the manipulator and his understanding of the disorders than in the use of any "highfalutin" words to cover ordinary rubbing.

From the days of Hippocrates history affords parallel examples

of theories formed in advance of their proof. For our present purpose we will cite but one, that of Asclepiades (128-56 B.C.), a Greek physician, who founded a school and practised at Rome, and was very popular with the Romans on account of his simple and agreeable remedies. He thought that physicians ought to cure their patients safely, quickly, and pleasantly, and with this object in view he relied mainly on diet, bathing, exercise, and friction. He considered that the body had innumerable sensitive canals running through it, in which moved the nutritive juices and plastic atoms. So long as this movement went on without disturbance health continued. But disturbance caused sickness, and the normal movement of these juices would be disturbed by abnormal increase of their atoms, by their irregular distribution, by too great blending together, and by too swift movement of the same, and also by dilatation and constriction of their canals. Proceeding on these principles, or theories, rather, Asclepiades renounced almost entirely the use of medicines and attempted to restore free movement of the nutritive fluids and plastic atoms by means of rubbing. The soporific effects of gentle stroking he also recognized. With friction he combined active and passive motion, and no doubt he was an adept at massage in his day.

Asclepiades thus foreshadowed the discoveries made long after of the functions of the vasomotor nerves and of the muscular coat of the blood-vessels in regulating the calibre of these vessels; and to a large extent, also, he predicted the pathology of inflammation in the congregating of white blood-corpuscles.

Seen from the light of recent studies of the neuron, the experiments of Professor Golz, of Strassburg, narrated in *Virchow's Archives* for 1875, possess new interest. After opening the abdomens of animals and applying percussion by light and frequent blows over the stomach and intestines, the peritoneum at first became paler from constriction of the vessels, but continuance of the percussion caused dilatation. When the percussion was first applied over the abdominal walls, and these opened afterwards, it was seen that the vessels of the abdominal cavity, especially the veins, were dilated and distended with blood. The heart's action was considerably retarded, owing to the reflex influence of the percussion upon the inhibitory action of the vagus, and also to the sudden withdrawal of blood into the vessels of the abdomen.

Continued still longer, the pulsations of the heart became less, and finally ceased, as did also respiration.

Here we see the primary effects of percussion (a form of massage) causing constriction of blood-vessels from stimulation of their vasomotor nerves and muscular coat. Longer continued, this same percussion produces an opposite effect, dilatation of vessels from over-inciting them and wearing out their irritability, and with still more of it pulse and respiration cease. Corresponding to the first influence of percussion, we would now suppose that the projections of the neurons had been brought into closer juxtaposition; to the second, that they had got somewhat tired out and relaxed; to the third, that they had lost their capability forever to connect, and the animal dies. It would be exceedingly interesting to examine the neurons connected with the solar plexus of prize-fighters when they knock the wind out of each other by a blow upon the epigastrium.

If this theory of the mechanical action of nerve-cells and their processes holds, then remedial mechanical measures, such as massage, kneading, stroking, percussion, passive and resistive movements, all of which act upon peripheral and central neurons, will receive an additional explanation to what we already know of their effects upon skin and muscles, blood-vessels, lymphatics, and nerves. We would then say of a nervous person with too much tension, who cannot let himself go to rest, that under the influence of appropriate manipulation he is soothed and quieted to sleep, that his peripheral and central neurons have been coaxed to relax; while, on the other hand, if such a patient should receive too vigorous manipulations, the peripheral irritation caused thereby would induce both voluntary and involuntary resistance, increase the tension, and bring the processes of the neurons into still closer contact. Or take languid individuals with flabby tissues and give them pretty vigorous manipulation. Their muscles tone up and become firmer; then we will have to presume that their neurons have come into closer and more natural contact. It was old Hippocrates who said in his aphorisms that "Hard rubbing binds; soft rubbing loosens; much rubbing causes parts to waste; moderate rubbing makes them grow."

By means of training and repeated efforts paths of resistance in brain, spinal cord, and nerves are made easier, thought, will, and action become less difficult, and the terminal arborizations of the

neuraxons and their collaterals connect more readily with the dendrites of the nerve-cells, constituting what is usually called education, which should be so adjusted

> "That outer man and inner soul
> Maintain their balance true,
> Till every string on being's lyre
> Gives forth its music due."

On the whole, this theory that nerve-cells and their processes act upon each other by contiguity and not by continuity would seem to be consistent with the behavior of tissues in other parts of the body, and even with the propagation, prolongation, and cessation of life itself.

IX.

Massage of Internal Organs.

MASSAGE OF THE UTERUS AND ITS SURROUNDINGS, WITH A REPORT OF TWO HUNDRED AND THIRTY-NINE CASES.

"Genius breaks from the fetters of criticism; but its wanderings are sanctioned by its majesty and wisdom."

"MASSAGE and expression being the only resort in the hands of primitive people for the completion of difficult labor, they intuitively, by instinct and by long practice, have brought them to a certain state of perfection, although brute force is more relied upon than dexterous manipulation. The methods are so simple, so natural, and so thoroughly in accordance with sound mechanical principles that they have produced good results. Deprived of the brutality of physical force and aided by science, these very means which have so long and so well served the ignorant will attain a higher degree of perfection, and will serve far better the scientific obstetrician." * One would think from these words of Dr. George J. Englemann that educated physicians were not in the habit of making use of such procedures, and that they know but little about them. For many years—a quarter of a century at least—physicians have been taught and have practised massage of the uterus through the medium of the abdominal walls as a reliable means of overcoming inertia during labor and when there are partial or irregular contractions complicating labor, also when there is post-partum hemorrhage or danger of the same, and with modified position and pressure to correct malpositions of the fœtus, as well as for the expression of the placenta. For fulfilling such important indications as arousing, equalizing, and strengthening the contractions of this hollow, involuntary muscular organ under such momentous circumstances, even though applied in a mediate manner, there is no longer any question of the well-known efficacy of kneading, squeezing, and pressure. It is a wonder, however, that massage has not been used earlier for atonic conditions of the uterus other than those connected with the

* The American Journal of Obstetrics, July, 1882.

parturient state, and it is equally surprising that it has not been more approved and used for the invigorating of voluntary muscles and nerves which are much more accessible and grant a more ready response. If it were as easily administered as pills, powders, and liquids, its use would be much more extensive.

Massage of the pelvic organs should be intrusted to those alone who have "clean hands and a pure heart," and such a thorough knowledge of the pathology and treatment of uterine affections as is possessed by the most accomplished gynæcologists. It should not be confided to any professional manipulator, however skilful. According to testimony given by eminent members of the Swedish Academy, Major Thure Brandt, a Swedish gymnast, proved his skill in the use of massage in uterine affections as early as 1862. Brandt's method excited much adverse criticism, which, however, passed away as the excellent results obtained became better known. In the hands of a layman it was doubtless at first used without proper discrimination and extravagant results were claimed. In 1865 Dr. A. D. Sinclair, of Boston, began using massage of the uterus and its surroundings with the patient in the genu-pectoral position for the correction of retroversion and retroflexions, but did not publish his experiences with this method. The next to interest himself in this was a physician, Dr. Gustaf Norström, of Stockholm, who used the treatment rationally and in cases that he could understand. He found massage especially successful in chronic metritis that had not arrived at the period of induration; and after this in the affection known as hemorrhagic endometritis. He also obtained good results in prolapse of the vagina and in chronic inflammations of the ovary. The catamenia, acute and subacute affections, and pregnancy are contra-indications. In his report of 1876 is given his experience, which had then extended over two years and a half, and which shows that in one hundred and thirty-eight cases of chronic metritis he obtained forty-three complete cures and more than seventy nearly complete. Nine cases of hemorrhagic metritis were cured, and in seven cases of sterility complicating chronic metritis there occurred conception in two soon after the cure had been effected. In the course of his manipulations he has never had a fatal termination nor the supervention of general peritonitis.

The procedure consists in introducing an index-finger into the

cul-de-sac behind the cervix in such a manner that the posterior surface of the uterus is reached. This is then raised as far as possible, while the fingers of the other hand grasp and knead the uterus through the abdominal walls. Sometimes the uterus is pressed against the walls of the pelvis laterally or against the posterior surface of the symphysis pubis. Massage acts in these cases by removing and preventing the inflammatory stasis, by producing resorption of leucocytes and elements which have migrated into the surrounding tissues, and by restoring tonicity to the tissues.

In similar cases Dr. Asp * has obtained favorable results by means of general massage and remedial gymnastics without any local manipulation. At the time of his report in 1877 he had treated in this way seventy-two cases suffering from affections of the uterus. Of these thirty-five, or 48.6 per cent., were cases of chronic inflammation of the uterus. Three-fifths of these were married and two-fifths single; fifteen recovered, thirteen were much improved, and seven remained as before treatment. The average length of time of treatment was for those who recovered 8.6 weeks for single women and 15.4 weeks for the married. Six of the cured cases continued well, three had no relapse at the end of a year, three relapsed at the end of two, nine, and ten months respectively, without ascertainable cause, and in three others there was relapse after birth or miscarriage. Eleven cases of anteflexion and one of retroflexion were also treated in this general manner. Ten of these were in single women. During the treatment the subjective symptoms disappeared and the patients felt perfectly well; the flexions remained unchanged. The average length of time of treatment was 7.6 weeks. Their subjective symptoms, in the opinion of Asp, proceed from a hinderance to the circulation in the uterus which can be removed by means of massage. Four of his cases were chronic inflammation of the surroundings of the uterus (perimetritis, parametritis), and of these three improved much in from four to twelve weeks. In one case of myoma and another of fibroma of the walls of the uterus the general condition of the patients was improved, but, of course, not the local. Favorable results were also obtained in other affec-

* Dr. Asp is director of an institution at Helsingfors for the treatment of diseases in which massage and movements are appropriate. He is also professor of microscopy and pathological anatomy in the University.

tions connected with the uterus, and of the whole seventy-two cases, twenty-three were said to have recovered entirely, thirty-four were improved, and fifteen were unchanged. This author concludes by saying that this method merits more attention from physicians in the future than has been accorded to it in the past.*

If Robert Burns had been more familiar with the poetry that had been written before his time, he confesses that he would have dared less. In that event the world would have been the loser, and his verses would have lacked their pathos and fervor had he known that the same thoughts had been expressed in other words. Human minds work in the same channel. Dr. A. Reeves Jackson, of Chicago, wrote to me that if he had known of the published experience of Norström and others he would have made his paper on "Uterine Massage," which he read before the American Medical Association and published in the Boston *Medical and Surgical Journal* for September 23, 1880, much more complete. Like Burns and his poetry, it is well he did not, for in that case his article would probably have lacked the clearness, vigor, and attraction of independent thought worked out and well expressed which caused the article to be quoted by two French medical publications (*Garnier's Annuel* for 1881 and the *Journal de Médecine de Paris,* June 30, 1883) and again reëchoed back to American shores to be quoted from the latter by the *Medical News* of Philadelphia of July 21, 1883, as if Dr. Jackson were a Frenchman and such treatment had never before been heard of on this side of the Atlantic.† Dr. Jackson claims no originality, and his paper could not have been more modest.

From the records of two hundred and seventy-seven gynæcological cases the doctor found one hundred and seventy-nine, or 64.6 per cent., denominated subinvolution, hypertrophy, hyperplasia, chronic metritis, and simple enlargement. The great variety of treatment is an indication of the inefficiency of it, Thomas, Scanzoni, Atlee, and others being quoted to show the hopelessness of

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* Virchow and Hirsch's Jahresbericht, 1878, Vol. II., p. 570. Norsk Med. Arkiv, Bd. 11, No. 22.

† Such innocence is a fair sample of the interest, or the want of interest, taken in massage. I was amused at seeing a part of one of my own papers used as an original article in a Western medical journal without the quotation marks, and again quoted from this by a journal in New York where it was first published.

relief from the usual methods. This author points out that all the causes of uterine enlargement form an obstruction to the return of the venous circulation. The indications are to lessen the undue and partially stagnant supply of blood, to overcome the stasis, and to promote resorption of the excess of the tissue. All the remedies generally employed act by lessening vascular fulness, but massage has proved more efficient in doing this in Dr. Jackson's hands than any other single means. Not every case of uterine enlargement is amenable to squeezing and kneading. In some it might be injurious. Massage is available in the first stage when the uterus is found low down in the pelvis, enlarged, tender, and spongy, and having a doughy elasticity, its sinuses gorged with blood, and newly formed connective tissue in its walls. Displacements and distortions alone do not preclude massage. If the first or hyperæmic stage is passed and the organ has become firm and indurated like cartilage, massage and all other remedies will be useless. The author makes a noteworthy distinction in pointing out the fact that the pains and discomfort accompanying enlargement of the uterus really are seated in the walls of the abdomen, though usually referred to the uterus; and these are first subjected to massage, gently and superficially to begin with, then more deeply and vigorously until sensitiveness lessens sufficiently to allow the uterus to be kneaded. If this cannot be done effectually through the abdominal walls, " the first and second fingers should be passed into the space behind the vaginal portion, which is pulled gently forward and then permitted to return to its former position. This is repeated a half-dozen times or more, when the fingers are pushed higher up, so as to reach the supravaginal portion of the cervix and lower part of the body. The upper part of the uterus being now steadied by the hands on the outside, it is pressed between the fingers of both hands repeatedly for a few seconds at a time and then relaxed. Every portion of the organ which can be reached should be subjected to these momentary squeezings. Then the manipulations should be reversed. The intravaginal fingers should be put in front of the cervix, and the latter pushed backward several times as far as possible short of causing pain. Then, their ends being passed into the space between the bladder and the cervix and their pulps turned against the latter, the fingers of the outside hand should be so adapted that the uterine body may again be brought between the compressing

forces, when the squeezing and imparted movements are to be repeated as before. Alternating with the process described, the uterus should be frequently elevated in the pelvis and held for a few seconds." After this the details of several cases are given in which benefit came from this mode of procedure.

When the hyperplasia is dependent upon some local condition outside of the uterus, such as inflammatory exudations in the pelvic cellular tissue, and when spots of tenderness and indurated fibrous bands are found fixing the uterus in some abnormal position, the enlargement will remain so long as the surrounding induration continues, owing to the disturbance of the circulation which passes through the cellular tissue in going to and coming from the uterus. The removal of these conditions external to the uterus must be secured by appropriate means before any diminution can be obtained in its size. Amongst appropriate means massage is not suggested by Dr. Jackson. It is just here that this treatment has been taken up and used effectually by another independent worker, Dr. Otto Bunge, of Berlin.

In the *Berliner klinische Wochenschrift* of June 19, 1882, Dr. Bunge published an article reporting favorable results from massage of the abdomen, particularly of the uterus and its surroundings. In case of atony of the intestines with constipation he advises patients to *masser* their abdomens themselves, and with advantage. He does not feel the apprehensions of Von Mosengeil, that perforation might be caused in this manner by the possible existence of ulcers, so long as the massage is performed with proper gentleness and never in recent affections. He has used massage most frequently for the removal of the sequelæ of periuterine cellulitis and pelvic peritonitis of the most varied forms which had defied the customary methods of treatment. When engorgement of the uterus was also present, as in subinvolution and movable retroflexion, this method proved excellent, as may be seen by some of his tabulated cases. His mode of using massage was similar to that of Norström and Jackson. But as his aim was often the loosening of adhesions and the dispersion of indurations, the manipulations in such cases were directed towards the seat of these, working more around the uterus, internally and externally, and pushing, pulling, or raising it in such ways as would detach the adhesions. The good effects of this treatment showed themselves by the dispersion of the

pathological products, thus increasing their surface for resorption, by furthering the circulation and by stirring up the contractions of the uterus. One patient declared that while being *masséed* she felt real after-pains, although four years had elapsed since her last confinement. Cases were treated in which the uterus was so closely fixed to one or the other part of the pelvic walls by adhesions that at first it was not possible to penetrate between them. With these only gentle, steady pulling or pressure could be used, but by patience and perseverance "they became the most thankful of all cases." Dr. Bunge soon learned that precaution, tact, and skill were necessary, and he candidly confesses that he treated his first cases too heroically. Injections of warm water, which he also uses at first with manipulation, act very much in the same manner as massage, but not so effectually in stretching, loosening, and further resorption. When there are inflammatory products in the cul-de-sac of Douglas or in the perivaginal tissue the author says that less benefit proceeds from the usual local medication than from the mechanical pressure made in applying it by means of the speculum, which produces resorption; but it is better to have these products under the sensation of touch. Contra-indications of massage in these cases would be those pathological conditions in which purulent or sanious products are present or even suspected. In concluding, Dr. Bunge strongly recommends massage for the removal of old perimetritic and parametritic sequelæ and congestion of the uterus; and from the results gained he promises a great future for massage in the treatment of flexions of the uterus without instrumental aid. In the time that had elapsed from the presentation of his paper to its publication cases which were not quite cured had got well, and others had come under treatment.

Dr. Bunge warns physicians against considering massage a panacea for all sorts of uterine affections.

Winiwarter, in the *Wiener medicinische Blätter,* 29-31, 1878, reports the case of a woman, seventy-nine years of age, suffering from a multilocular ovarian cyst with consequent œdema of the lower half of the body. After repeated aspirations of the cyst, the fluid always accumulated in greater quantity than before. The patient declined an operation for its removal. Winiwarter concluded to try massage upon the legs, and this soon removed the swelling, relieved the pain, and increased the urine. Later he

extended the massage upon the abdomen and over the ovarian cyst, and this decreased in size and remained smaller. Œdema did not return and the condition of the patient was improved. It is noticeable that when Winiwarter was at one time hindered from repeating the massage for a while the former condition of the patient returned. The difficulty, however, soon disappeared, the swelling becoming smaller, when he resumed the massage himself. He emphatically guards himself against being open to the accusation of believing massage to be able to take the place of ovariotomy or aspiration (as it did in this case), but in cases where ovariotomy or aspiration is impracticable or refused massage may be of use. In his opinion the intermittent pressure of massage acts more powerfully than permanent or continued pressure.

Dr. H. P. Orum has found massage efficacious in removing the after-effects of periuterine cellulitis when other means have failed. The infiltration of the connective tissue after parametritis is, in the majority of cases, comparatively speedily absorbed; but in a few cases it remains for a long time. At Professor Howitz's clinic massage is used successfully in these cases for five or ten minutes every other day after all other therapeutic measures have been exhausted.

In the *Journal de Médecine* of January 3, 1886, we learn that Dr. Prochownik has used massage in one hundred and three cases of chronic uterine trouble. Sixteen of these could not go on with the treatment on account of the pain due to the inexperience of the operator. Five of the remainder were cases of small intraligamentary tumors, and two of these disappeared under massage and did not return. Of thirteen cases of prolapsus of the uterus only one was cured and two improved. Of ten cases of chronic metritis four were cured and three improved. Of eighteen cases of exudation, including five of hæmatocele, eight recovered, two improved, and three were slightly benefited. (What became of the others?) The most suitable cases for massage were found to be those of old cicatricial, contracted remnants of exudation, and amongst forty of these twenty-four were cured and ten greatly improved. In ten cases of latent gonorrhœa painful joint-affections followed associated with slight fever, so that Prochownik was led to regard this as a contra-indication for massage. Other contra-indications are pregnancy and consumption. In addition to manipulation with the

hands and fingers in the region of the uterus he also employed what he calls passive massage in some of the cases. For this purpose a series of vulcanite cylinders were employed in order to gradually dilate the parts contracted by cicatrix or spasm.

According to Professor Bartholow electricity is only of value in uterine disorders when there is *no* hyperplasia of the connective tissue. According to various observers massage is of great value when there is hyperplasia of the connective tissue.

More recently others have had favorable experience with massage in gynæcology. By this means internally and externally, and pushing the uterus upward and forward and allowing it to fall back again, varied with resistance to adduction and abduction, Professor F. von Preusschen * benefited a case of prolapsus uteri of thirty-one years' duration so much that after the first day of treatment the uterus remained in the pelvis, and at the end of three and one-half months there had been no prolapse. The duration of treatment is not stated. The raising of the uterus is of value in correcting the retroversion and for separating adhesions between the uterus and bladder. The resistive movements of the thighs cause the whole muscular floor of the pelvis to contract, and this can be increased by the patient raising her hips at the same time. In this way the lax muscles regain their tone, they restore the proper support to the cervix, and narrow the opening for the vagina in the pelvic floor.

By like procedures Dr. Paul Profanter † cured a case of prolapsus of twenty-seven years' duration in ten days, and another case of complete prolapsus of ten years' duration in a month. In the last case the uterus remained five centimetres above the perineum after the first treatment. Besides these he has used massage in fourteen other cases of parametritis with abdominal fixation of the uterus, chronic ovaritis and periovaritis, fixed retroversion, and one case of retro-uterine hæmatoma. Abnormal fixations and positions were removed within a few weeks, and the accompanying pains and discomforts also disappeared. The conditions which were found by careful palpation before and after treatment are shown by woodcuts. The results were surprisingly favorable.

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* Centralblatt für Gynækologie.

† Die Massage in der Gynækologie, von Dr. Paul Profanter, Vienna.

An eminent writer has styled massage an agent of singular utility. Its effects in such cases as the above show it to be an agent of plural utility—in the dispersion of morbid products, in the loosening of adhesions, in correcting local and general disturbances of circulation and the morbid secretions dependent upon these, in restoring contractility and tonicity to organs composed of involuntary muscular fibres, as the uterus, the bladder, and the intestines, and thus enabling them to resume their normal functions. Massage of the uterus and the tissues adjacent to it, first brought prominently to the notice of physicians by a layman, has found its place in rational therapeutics through the instrumentality of Norström, Asp, Jackson, and others. Norström seems to have been the next after Dr. Sinclair to use massage scientifically in these cases, the nature of which could be understood and the mode of action of massage explained. The beneficial effects of general massage upon local affections in women are shown by the experience of Asp and others before him, mentioned in Chapter V. Independently of anyone else, Dr. Jackson has neatly combined the advantages of internal and external massage so as to gain the best effects with the least effort, and just where he has left the increasing range of massage of the pelvic organs Dr. Bunge has taken it up and proved at one and the same time its good effects in the class of cases in which Jackson found it beneficial, and still further for the removal of indurations and adhesions around the uterus. Besides the experience of Prochownik, Von Preusschen, and Profanter here given, the medical journals now make frequent mention of the results of massage by others well qualified to judge; so that this method, which a few years ago was sneered at, has gained for itself a fixed place in the treatment of intractable uterine affections as well as in many other conditions. Some physicians who are either too busy or too modest to record their results, or who fear that they would be doubted, have told me of the excellent service that massage affords them in their own hands in uterine maladies which they can obtain in no other way. Other methods, however, are used for the same purpose, such as packing the vagina, gradual dilatation, etc., all of which are more or less imitative of massage. But skilful gynæcologists are not very likely to apply massage until everything else has failed, for it is tedious and difficult for the operator, painful and disagreeable to the patient.

X.

Massage, Exercise, and Baths in Cardiac Disease.

"Give me a calm and peaceful heart, from every murmur free."

PHYSICAL or external therapeutics, in contradistinction to medical or internal remedies, have come much into favor in the treatment of disease of the heart in the past few years. These are massage, resistive movements, saline baths, and mountain-climbing. Of these massage is the most generally applicable. It can be used in cases so weak as to preclude the possibility of applying any of the others. In almost every conceivable form of weak and diseased heart I have been called upon to do massage, and usually with marked relief and comfort. While it was being done and for some time after the patients have generally been able to lie on either side or flat on the back and often go to sleep in this position,—what they could not have done before. In other cases, where it was impossible for them to lie down at all, I have *masséed* with relief until within a short time of their death.

Massage of the chest over the region of the heart has a powerfully tonic and sedative effect on this organ, as either physicians or patients can prove by observing its effects in their own persons by means of Bowles's excellent stethoscope. Even a well but lazy heart will be found to beat much better and with clearer accentuation after a few minutes of massage, reminding one very much of the effect of using the bellows on a fire that burns slowly. This is most marked in the flabby neurasthenics.

The enthusiasm of Professor Oertel over massage of the heart may have gone a little too far, but perhaps this may have been necessary in order to wake up the profession to its great value. In a recent work on this subject he considers that massage acts upon the heart in the same way that it does upon the muscles of the extremities. In order to do this, the chest-wall would have to be removed, so that the heart might be grasped and directly *masséed*—a procedure that would hardly be justifiable in the human being. While the patient stands he advises that gliding pressure should be made upon the chest-walls downward and inward, the benefits of

which, he states, "are not only referable to its influence in perfecting expiration, but also to the direct pressure upon the heart influencing its nutrition precisely as massage benefits the muscles of the extremities." The patient would have to be pretty well to stand while this was being done. The influence of massage over the heart is indisputable, but evidently it must be more indirect and sympathetic than direct. Oertel considers this treatment indicated:

"1. When the heart muscle is weak from deficient nutrition, anæmia, or corpulence.

"2. When the arterial system is imperfectly filled and there is passive congestion as a result of insufficiency of the myocardium.

"3. When there are valvular lesions or obstructions to the circulation, the pressure of tumors, or constriction of the pulmonary orifice, emphysema, or curvature of the spine.

"4. As an accompaniment of treatment of the heart by mountain-climbing.

"It is contra-indicated in acute or recurring endocarditis or pericarditis, in acute and subacute myocarditis the result of sclerosis of the coronary arteries, and in general arteriosclerosis."

General massage, carefully administered, is of great aid to the peripheral circulation, lessens the work of the heart, tranquillizes the nervous system, and induces sleep in the worst kind of heart disease, and massage of the abdomen often works well as a diuretic.

Next to massage in its universality of application, and under circumstances in which patients have been too weak to undergo saline baths or mountain-climbing, come resisted movements. These, combined with the saline, sparkling waters of Nauheim, were first brought prominently to notice by the Drs. Schott, who up to 1891 had treated in this way two thousand seven hundred cases of cardiac disease, mostly with great benefit or recovery. Each resisted movement of extremity or trunk is slowly and completely executed, followed by a pause, after which the opposing movement alternates in the same way, while the physician or person who makes the resistance is ever watchful to avoid anything like fatigue, difficulty of respiration, or increased disturbance of heart, and should such arise a longer pause is given. Some of the advocates of this method state that no movement is to be repeated twice in succession to the same limb or group of muscles, but I have yet to learn that Schott himself is so absolute in his directions.

The immediate effect of the bath is not quite so marked as after the exercises, but it lasts longer, while the exercises can be used repeatedly on the same day and without regard to place. In illustration of this the resistive movements were given to a boy who was weak and anæmic. Percussion showed dilatation of the heart. Two skiagraphs were taken, one before, the other fifteen minutes after a quarter of an hour of exercises of moderate resistance. It was evident that the heart had contracted strongly on both sides and that it had changed from the shape of an orange to that of a lemon and was one-half inch smaller by measurement. For the sake of comparison and in order to ascertain the effect of the Nauheim effervescent bath alone Dr. Schott had a somewhat similar case, a girl fourteen years of age, carried to the bath and after this back to the table. It was found as a result of the bath that the heart had contracted about one centimetre (less than half an inch) in its horizontal diameter. This is getting matters down pretty fine.

It has also been shown by Dr. Schott to the satisfaction of impartial observers that wrestling until the breathing became short or excessive bicycling produced dilatation of the heart and weakened it, from which he has deduced the axiom,—

"Systematic exercises strengthen the heart, unsystematic exercises weaken it." *

Dr. W. Bezly Thorne, of London, who has witnessed the effects of systematic resisted movements in many cases, says of them: "The results are such as would scarcely be believed by any but an eye-witness. It is by no means uncommon in cases of dilatation to seen within one hour the oblique long diameter of the heart's area of dulness diminished by from three-quarters of an inch to an inch and a quarter; and, perhaps more surprising still, to observe a diminution by as many as two inches in vertical measurement of a liver which at first extended to the umbilical level, and to hear the patient, at the conclusion of what cannot be considered an ordeal, volunteer the statement that a load has been removed from the præcordium, that he breathes easier and more deeply, and experiences a sense of general relief."

When such good results can be obtained from massage or resistive movements alone it would seem almost superfluous to burden

* New York Medical Record, March 26, 1898.

patients with baths besides other than what may be necessary for cleanliness. Indeed, the advocates of the mineralized baths are not very clear in their ideas as to when the one or the other should be used or when they should be alternated or combined, so that these problems must be left to the discretion of the attending physician, who will be guided by the effects upon the patients. Dilatation of the arterioles and reduction of high arterial pressure may be obtained by slow, deep kneading of the muscles of the system at large; while, on the other hand, increase of the strength of the systole may be brought about by gentle resistive movements of the limbs.

The waters of Nauheim consist largely of a solution of chloride of sodium and chloride of calcium with an abundance of carbonic acid gas, and are of varying degrees of strength. Similar combinations are for sale at the drug-stores which can be dissolved in one's own bath-tub; but employed in this way the effects are not so favorable as they are at Nauheim, where pleasant scenery, bracing atmosphere, and absence from the cares of home all contribute beneficial influences. The duration of the bath at first should not exceed ten minutes, and the temperature of the water should be about 92° or 93° F. At the commencement the bath should be omitted every other day, then every third day, next every fourth day. Later the baths are given oftener and longer, their mineral ingredients are stronger, and the temperature is cooler, down to 88° or 85° F. Though the immediate effect of these sparkling waters conveys the impression of a bath of champagne and induces a sense of exhilaration, yet the first few baths are apt to be associated with a sense of oppression at the præcordium and the patients breathe more slowly and deeply for a few minutes. Respiration then becomes easy and continues slower. When infiltration or deposit has occurred in accessible places careful massage succeeds the bath. Sometimes the resisted movements are used to prepare patients for the baths, and they should be continued sufficiently long after until the patients can climb mountains. After the completion of the bath and exercise treatment Dr. Schott says he has seen patients make extensive tours through the Alps and even climb Mont Blanc and Monte Rosa without any difficulty. Nothing is said about the duration of the treatment. It must vary greatly to suit different cases and be limited or extended by the convenience of the patient.

It is emphatically declared that gymnastics or physical exercises by means of mechanical appliances should form no part of the system of resisted movements, and that they are even opposed to it as harmful. They ought to be helpful when improvement has sufficiently progressed.

Possibly the advocates of the saline bath in disease of the heart have not taken sufficient account of the fact that when a body floats in water it is buoyed up by an elastic resistance equal to its own weight, and this presses the venous blood and lymph back to the heart from the parts that are submerged. This is massage by hydraulic pressure of the immersed portions of the body.

According to Fleischl, the shock of the blood sent into the capillaries at each cardiac systole has a mechanical action in aiding the chemical processes of tissue change in somewhat the same way, though to a less extent, as a blow upon a percussion cap. If a heart is too feeble or the resistance in the vessels too great to allow the blood entering the aorta at each systole to give a distinct forcible impulse to the blood present in the arteries, the chemical changes in the tissues will be sluggish and imperfect. It is therefore of the utmost importance in the treatment of disease to maintain the action of the heart and to stimulate it when flagging. (T. Lauder Brunton.)

Dr. Douglas Powell, in the *British Medical Journal* of April 9, 1898, helps to define more clearly the use of massage and exercise. He tells us that massage is a means of helping on the convalescent stage of acute heart disease and of combating the tendency to stagnant circulation in those who are disabled by chronic heart disease. The treatment, he thinks, is still more useful in maintaining the circulation and mildly stimulating the coronary circulation in those who are bedridden, and on that account suffer from impairment of heart nutrition and chilly extremities, feeble pulse, torpid digestion, and passive congestion of the lungs. The treatment is not advisable in acute affections of the heart.

The effects of the Schott or Nauheim exercises are a stimulation of the heart's action, with a steadying effect or increased completion of the systole, improved circulation through the coronary vessels, and an increased motility of the blood by its readier passage in greater bulk through the muscles, thus relieving stagnation in the great internal organs, especially of their veins. The graduated

exercises may be regarded as a *counsel of perfection,* as a preliminary to the return to this increase of active life of which the condition of their heart admits, and also as a guide to what that measure of exercise will be. Resistive exercises are especially adapted for the initial treatment of those flabby, irritable, "stuffy" hearts, applying this term to cases of fatty infiltration and impaired metabolism which are met with in people of venous plethora. Irritation of a sensory nerve causes general contraction of blood-vessels.

In cases of chlorosis with dilated heart, after a preliminary week or two of rest, the Schott treatment is valuable if combined with a dry, bracing air and mild chalybeate. It is useful in commencing failure of the heart, in chronic valvular lesions, combined with less of other exercises, and also after such cases have been restored to a certain extent by digitalis. It is unsuited in all cases of acute endocarditis while there is any trace of activity of lesion left, and in cases of advanced cardiovascular changes of the nature of sclerosis, or in introspective people with neurotic hearts.

An excellent summary of this treatment of heart affections was given by Sir Grainger Stewart before the British Medical Association at Carlisle. He has fully satisfied himself on the following points:

1. That in the great majority of cases of cardiac dilatation the area of cardiac dulness diminishes perceptibly during each administration of massage.

2. That the character of the cardiac sounds and the rhythm and strength of the pulse correspondingly improve.

3. That the patients usually experience a sensation of comfort and feel the better for the treatment.

4. That although the immediate favorable effects pass off in a few hours, yet they frequently do not pass off completely, for he has often found the line of cardiac dulness within that with which they had started at the previous *séances.*

5. That repeated applications of massage bring about a permanent diminution of the area of dulness, with improvement of pulse and of the patient's sensations.

6. He has seen a case in which the so-called Schott treatments produced a deleterious effect, rendering the heart more irregular and intermittent. It was afterwards treated by massage alone on the following day with most striking benefit. It turned out that the

patient was not sufficiently well to bear the active movements, but was greatly benefited by the passive ones.

7. That on one or two occasions he has seen the manipulations produce unfavorable effects, apparently because the heart was too feeble and the patient was fatigued at the time of application.* (In this last case it is possible that the massage was too vigorous, or that the manipulator himself was not in good condition. Your reporter recently had to walk three-quarters of a mile in the teeth of a cold wind to give massage to a patient with a weak heart. The result was the only unfavorable one of the kind he had ever had: the patient was unduly fatigued. If I could have ridden to the patient's door, the result would most likely have been different.)

Dr. Albert Abrams † finds that any cutaneous stimulant—mechanic, chemic, or electric—will produce diminution of the size of the heart, with temporary dilatation of the lungs. Vigorous cutaneous friction by means of a wire brush seemed to afford him results in heart disease nearly as good as those obtained by the more elaborate treatment by means of baths, massage, and exercises. He quotes Moccucci, who sprayed the left half of the abdomen with ether in twelve cases of enlarged spleen with the result of decrease in volume of the spleen in all the cases. In repeating these experiments Dr. Abrams noticed a decided diminution of the size of the spleen in all the people he tried it on, irrespective of the fact whether the spleen was enlarged or not. Ether spray over the heart and over the liver caused decrease in size of both these organs. The results were confirmed not only by percussion, but also by sight, by means of the fluoroscope.

Mass ‡ has reported two cases in which patients apparently dead from chloroform syncope were resuscitated by compression in the region of the heart. In both cases respiration and radial pulse had entirely stopped and the pupils were dilated. The manipulation of the heart in both cases was carried out for over an hour. Compression over the heart was used one hundred and twenty times a minute, and soon after it was begun the pupils became smaller and the paleness of the face disappeared. Afterwards both patients suf-

* Mechano-Therapy in the Treatment of Heart Disease: Dr. T. Stretch Dowse, 1898.

† Medical News, January 7, 1899.

‡ Berliner klinische Wochenschrift, 1892, No. 12.

fered from mental derangement, difficulty of swallowing and speaking, all of which passed off shortly.

If any more confirmatory testimony of the efficacy of massage for weak hearts were needed we certainly have it in the experiments of Professor Prus,* in which dogs were suffocated and brought back to life by massage of the heart. The supply of air was shut off by clamping an India-rubber tube which connected the tracheotomy cannula with an artificial respiration apparatus. Immediately after the death of the animals some of the rib cartilages in front of the heart were removed, the pericardial sac was incised, and the heart exposed. After it had been ascertained that there was no trace of any contraction of either auricle or ventricle, Professor Prus waited from fifteen to sixty minutes before he began his efforts at artificial resuscitation. Then the clamp was removed and artificial resuscitation started; the heart was grasped in the right hand so that the thumb rested on the right ventricle, and the four fingers surrounded the left ventricle. Both ventricles were then compressed with moderate force, the compressions being made to imitate the systolic and diastolic action of the heart. In thirty-one cases, or seventy per cent., life was restored. In chloroformed dogs under the same conditions, seventy-six per cent., and in dogs shocked by the electric current, fourteen per cent., were brought back to life. An attempt to try massage of the heart was made on the body of an alcoholic who had committed suicide by hanging, but without success, as might have been expected.

* Treatment, October, 1900, and New York Medical Record, November, 1900.

XI.

Effects of Warm Douches, Massage, and Friction upon the Expansion of the Lungs.

"Are not Abana and Pharpar, rivers of Damascus, better than all the waters of Israel?"

THERE are often more ways than one of accomplishing the same object, and, much as we would like massage to prove the best, we sometimes have to concede that other means are more effectual. In an instructive article in the *Revue d'Hygiène Thérapeutique* for July, 1894, Dr. J. Nicolas has given us the results of his experience, demonstrating that the warm douche alone produces greater pulmonary expansion than massage does alone. But we think if he had combined the two he would have obtained greater expansion than from either; and if to both he had united passive and resistive movements of the arms to expand the chest, somewhat after the manner of artificial respiration, there would, no doubt, have been obtained the greatest expansion of all. However, the paper is so exceedingly interesting and valuable that it is well worth while to reproduce it in brief for those who may not have the opportunity of reading it in the original.

The thermal station of Mont-Dore, in the South of France, each year has a large number of patients affected with asthma, emphysema, or chronic bronchitis. For these the warm douches are frequently used, as well as the imbibition of the water and inhalation of the mineral vapors which constitute the basis of treatment. Those who favor this threefold use of the water * have hitherto regarded the warm douche as only a form of revulsion. The heat and the force of the percussion of the douche determine a powerful attraction of the blood to the skin at the expense of the deeper parts; and the perspiration which is thus provoked may bring about resolution of chronic engorgement of the lungs. But these effects hardly suffice to explain the comfort which the emphysematous patients

* The waters of Mont-Dore are warm, alkaline, arsenical, and ferruginous, colorless, and slightly charged with gas.

experience immediately after the douche; neither do they account for the rapid modification which supervenes in their respiration.

Patients attacked with pulmonary emphysema having attracted the attention of M. Nicolas by the amplitude and the freedom of respiration after the warm douche upon the chest, he has verified their assertions by auscultation and by measurement by means of the spirometer. He found that the vesicular murmur, which was scarcely perceptible to the ear before the douche, became clearly perceptible afterwards—a proof that there was more air introduced into the chest and with greater rapidity, and this was confirmed by the aid of the spirometer.

The respiratory capacity having been measured several days in succession and several times each day, before and after the douche, the figures below indicate an average:

Case I. Slight emphysema, slight chronic bronchitis. Pulmonary capacity before the douche, three thousand five hundred cubic centimetres (three hundred and thirty-three cubic inches); after the douche, three thousand eight hundred.

Case II. Very pronounced emphysema, slight bronchial catarrh, frequent asthma at night. Pulmonary capacity before douche, eighteen hundred cubic centimetres; after douche, two thousand.

Case III. Bronchitis and emphysema. Lung capacity before douche, fifteen hundred cubic centimetres; after douche, eighteen hundred.

Case IV. Emphysema with frequent attacks of asthma. Lung capacity before douche, fifteen hundred cubic centimetres; after douche, nineteen hundred.

Case V. Chronic bronchitis, emphysema. Lung capacity before douche, eighteen hundred cubic centimetres; after douche, two thousand one hundred.

Case VI. Emphysema and asthma. Lung capacity before douche, eleven hundred cubic centimetres; after douche, thirteen hundred.

Case VII. Chronic bronchitis and emphysema. Lung capacity before douche, two thousand five hundred cubic centimetres; after douche, two thousand eight hundred.

It is useless to increase cases, as the results were uniform, and show an increased expansion of the lungs after the douche of from

two hundred to three hundred cubic centimetres (twelve to eighteen cubic inches) on an average.

From whence proceeds this expansion? It may be due in part to the reflex action which the douche by its warmth and strength of projection determines upon the respiratory nerve-centres, and which thus causes cessation of the dyspnœa. It may also be due in part to the absorption by the lungs of the vapor and of the carbonic acid gas which are set free from the mineral water when the column of liquid is broken against the chest. The vapor and the carbonic acid calm the bronchial spasm and thus facilitate the entrance of air into the lungs.

But, above all, the douche appears to act by the massage which it exerts upon the muscles of the thorax, exciting their contractility. And for this it ought to combine the following conditions of temperature, pressure, and duration: The temperature ought to be about 38° Centigrade (100° F.); the water should be projected in a horizontal jet or vertical column, but not in the form of spray, which lacks force, and under a pressure of five or seven metres; the duration ought to be for seven to ten minutes, as this length of time is indispensable for the successive and repeated irritation of the muscles of the thorax.

In order to supplement the insufficiency of their respiration, emphysematous patients make involuntary efforts with all the muscles that are capable of increasing inspiration. Not only the intercostal muscles are called into extra play, but also all the muscles inserted into the thorax: the pectorals, the trapezii, the scaleni, the large dorsal, the large serrati, and the sterno-cleido-mastoid increase their usual method of action and coöperate in the expansion of the chest. The massage produced by the douche increases the contractility of these muscles, and the inspiratory effort thus becomes less difficult and more complete.

In healthy people who desire to inspire the greatest volume of air possible by extra efforts for the purpose of ascertaining their lung capacity all the muscles capable of increasing the expansion of the chest are also called into their utmost play. With these subjects the stimulation of the muscles of the chest and of the back by the warm douche also increases the amplitude of pulmonary inspiration, but to a less extent than with the emphysematous, as shown by the following experiments:

Case VIII. Normal respiration. Lung capacity before douche of eight minutes, three thousand and fifty cubic centimetres; after douche, three thousand two hundred.

Case IX. Normal respiration. Lung capacity before douche, three thousand five hundred cubic centimetres; after douche, three thousand seven hundred and fifty.

The increase of muscular contractility is evidently the true explanation of the principal mode of action of the douche upon the thorax. Indeed, when the douche is replaced by friction upon the muscles of the chest and back nearly analogous results are obtained. Four experiments are reported in which massage has been practised—twice with the hand and twice with a flannel glove—for about eight minutes, care being taken to make the fingers penetrate into the intercostal spaces and to rub the pectoral, trapezii, and other muscles in the direction of their fibres, but avoiding compression of the chest.

Case X. Healthy subject. Lung capacity before massage, two thousand eight hundred cubic centimetres; after massage, three thousand.

Case XI. Slight emphysema. Lung capacity before massage, three thousand five hundred cubic centimetres; after massage, three thousand seven hundred.

Case XII. The same patient as Case XI. is rubbed with a flannel glove for eight minutes. Lung capacity before friction, three thousand five hundred cubic centimetres; after friction, three thousand seven hundred.

Case XIII. Normal respiration. Frictions with flannel glove. Before friction, three thousand cubic centimetres; after friction, three thousand one hundred and fifty.

The observations on Cases I., XI., and XII. were all made upon the same patient. In comparing the results it is seen that the douche causes greater expansion of the lungs than massage or friction. On the other hand, massage or friction has the advantage of much more universal application, and even upon patients who are tuberculous or suffer from cardiac affections to whom the shock of the douche might be injurious.

The increase of respiration in consequence of the douche is not of long duration. Cold makes it cease rapidly; but in a warm and damp atmosphere the increase lasts a long time, three-quarters

of an hour to an hour, during which respiration is more full and more free. It is, therefore, on sound common sense that the custom has been established at Mont-Dore of first sending patients to the douche before making them sojourn in the inhalation-rooms, where they absorb by the lungs the vapor charged with the principal constituents of the mineral water, carbonic acid, iron, and arsenic.

This action of the douche repeated finally determines a permanent increase of the respiratory capacity, as has been previously demonstrated by M. Nicolas. In this way the diminution of the oxygenation of the blood is compensated in the emphysematous; and this explains in great part the incontestable efficacy of the waters of Mont-Dore against pulmonary emphysema, besides the alterative action of the waters, which lessens the frequency of the cough and diminishes the abundance of the bronchial catarrh.

In order to cure chronic emphysema it would be necessary to restore the elasticity of the air-cells, to repair the loss of substance of the alveoli, to reëstablish the capillary vessels that have disappeared; that is to say, the absolute cure of emphysema is no more to be expected from thermal waters than from other ways of medication. But ameliorations can be brought about by means of mineral waters externally and internally, and especially those of Mont-Dore, which are almost equal to a cure.

Even as patients affected with narrowing of the mitral orifice can live without suffering so long as their valvular lesion is compensated by a sufficient hypertrophy and contractility of their heart muscle, so also those whose lungs are attacked with emphysema find in the increase of pulmonary expansion, and consequently in the introduction of a greater quantity of air, a compensation to the limitation of their field of aeration of their blood. They no longer experience the same anguish, and can, to all intents and purposes, consider themselves cured. All the hydriatic customs at Mont-Dore tend to this result, but the douche has an immediate action upon respiration to which it has seemed desirable to call attention.

The number of cases in which massage was used is hardly sufficient to base a trustworthy comparison upon. Most people who have had their chests *masséed* will remember what delightful involuntary deep inspirations are produced. It would have been well if M. Nicolas had told us how the frequency of inspiration is affected by the douche and by massage. Generally respiration becomes

much less frequent as well as deeper and freer under massage. As expiration is also hindered as well as inspiration in emphysema, better results would probably have been obtained if M. Nicolas had had his patients' chests compressed so as to aid the expiratory effort. And if to the douche, the massage, and movements to aid in expanding and contracting the chest were added *effleurage,* or stroking the limbs and body *away from the heart* towards the extremities, so as to retard the flow of venous blood and hinder it from crowding the right side of the heart and lungs, we feel sure that the mechanical treatment would be most rational and the best results would follow. Here is one of those very rare instances in which rubbing down would be better than rubbing up.

XII.

The Effects of Massage upon Internal Organs.

UPON SIMPLE CHRONIC HYPERÆMIA OF THE LIVER; UPON ATONY OF THE STOMACH AND INTESTINES; UPON INTESTINAL OBSTRUCTION, AND UPON PERINEPHRITIC INDURATION WITH SEVERE NEURALGIA, ETC.

> "Last, with a dose of cleansing calomel
> Unload the portal system—that sounds well."

CONTINUING a consideration of the effects of massage upon internal organs, we can easily see that the ascent and descent of the diaphragm in respiration, and the influence of exercise in general, keep up a sort of perpetual massage of the liver, which materially aids its functions and preserves the equilibrium of its circulation. Loosely suspended beneath the diaphragm by folds of the peritoneum, the situation and attachments of the liver are peculiarly favorable to allow it to move in any direction, to be pushed upward by full intestines or downward by dilated lungs, to be drawn upward by the arched diaphragm of phthisis or to gravitate downward when the intestines are empty. While in health, natural movements and ordinary exercises suffice to keep the liver in good condition, yet when this organ becomes hyperæmic, these are of necessity often lessened and insufficient. At every meal there is an increased flow of blood to the liver, and there may be too great a determination of blood to this organ from overfeeding, the portal vein itself being too much filled, and all the digestive organs overtaxed, to overcome which the kings of the Sandwich Islands had themselves *lomi-lomied* after every meal. When this state of affairs has been too long continued without anything to counteract it, there may result hepatic engorgement, the treatment of which by the douche and massage has been successfully carried out by Dr. Durand-Fardel, Director of Vichy.* According to this writer, these are valuable adjuncts to other treatment. Simple hepatic engorgement or chronic hyperæmia of the liver is indicated by general or partial enlargement of the organ, usually of the left lobe. There are no tumors or inequali-

* Bulletin Gén. de Thérapeutique, Vol. C., 1881, p. 241.

ies of surface nor excessive hardness. Pain is only observed at ntervals, whether spontaneous or aroused by pressure, and is at imes wanting. It is neither of the character nor fixity of cancerous ain. Icterus may be absent or faint. There is no cachectic look, s in organic affections. Neither the glycogenic nor hæmatosic unctions are at fault. Anasarca and ascites are absent. Simple ngorgement of the liver is susceptible of resolution after long dura- ion. Its persistence may lead to the belief that hypertrophy or nduration has replaced it.

Of one hundred and thirty-three cases noted by Dr. Fardel, orty-three were said to have followed upon acute attacks resem- ling hepatic colic, seventy-two developed gradually, and eighteen a a latent manner, their advent being masked by dyspeptic symp- oms. Whatever the method of onset, this sort of engorgement, hen fully developed, presents nearly the same symptoms in every ase. It may be connected with cardiac disease. The time-honored eatment by Vichy has comprised simply baths with the internal se of the waters. Fardel has added to these douches and massage er the hepatic region. The douche is in the form of a fine spray, nd is used five or ten minutes at a time, every other day to begin ith, at a temperature of 93° F., and just before the bath. It is llowed by a general feeling of buoyancy and of relief in the patic region. While the douche itself is a sort of massage, yet ere are cases where massage also may be employed. Then the domen is first kneaded altogether, after which the hand is gently assed over the hepatic region, the skin of which is at first ueezed and afterwards the deeper parts are worked, and this is ternated with tappings by means of the palmar surface of the ngers, and finally the liver itself is kneaded, its lower edges being ised and seized by the hand. These manipulations are done with eat gentleness and gradually accomplished, not being finished at e first sitting. The procedure takes from five to twenty minutes, nd is repeated every other day. Buoyant feelings result, and the assage is agreeable while being done. Intercostal neuralgia is not contra-indication for massage, as it is thought to be for the douche. y massage the liver is partly emptied of its fluids, the circulation favorably acted upon, and absorption hastened. In most cases is treatment is satisfactory, the general condition of the patient mproves, and the dyspeptic symptoms disappear. The liver does

not always diminish in size during the month or so that the patient is under treatment, but the diminution and general improvement go on after the patient leaves. The entire treatment of these cases lasts for several years, and what is gained at each visit is retained, and in the great majority of cases the patients ultimately recover.

It will be observed that the careful manner of applying massage to the liver by Fardel is as much like that of Jackson in applying the same treatment to the uterus as it possibly can be. The position of the patient, the state of the stomach and bowels, and the time at which massage may be used to the best advantage for hyperæmia of the liver are not spoken of by Fardel. For such a purpose, I prefer that the time shall be long after a meal, when the stomach and bowels are comparatively empty, and that the patient shall be sitting, with the body inclined forward, resting upon the elbows, so as to relax the abdominal walls and allow the liver to gravitate downward and forward, and this will be greatly aided by the patient making gentle, deep, and prolonged inspirations.

In poorly nourished people who gain flesh under massage and feeding, no small part of their improvement may often be due to the effect of massage over the region of the liver, by which its functions are stimulated; for the bile aids the pancreatic juice in emulsifying fats and preparing them for digestion; besides, its presence in the intestines excites their peristaltic action, as does the immediate mechanical effect of massage itself. Many have, no doubt, heard of the invalid lady who was suffering from constipation and, as a result of this, indigestion. Her friend, calling one afternoon, inquired, "Do you ever knead your bowels?" The invalid meekly replied, "Indeed, ma'am, I cannot very well do without them." The resulting burst of laughter shook up the abdominal viscera to such an extent that the constipation was relieved, the indigestion was cured, and the patient got well. There is truth in the old adage, "Laugh and grow fat." "Shake up the chylo-poetic viscera" is the doctor's language for the same, and hence he often prescribes horseback riding. Obstruction of the excretory gall-ducts from catarrhal swelling or collection of mucus might sometimes be relieved by massage squeezing out the contents of a distended gall-bladder, and thus pushing the obstruction before it. In the disappearance of icterus and sudden improvement following examinations of the liver this is probably what has occurred.

Atony of the muscular coat of the stomach or intestines with deficient peristaltic action and consequent disturbances of digestion, accompanied with distention from flatulence or solid contents, is usually benefited to a marked degree by appropriate massage after ordinary exercise and other measures fail. That benefit is more likely to follow here from repeated treatments than as an immediate effect would show that the nerve-centres that preside over these functions have undergone a nutritive change which has taken time to produce, and hence that the improvement would most likely be lasting. Moreover, when the alimentary canal is distended by gas or overburdened by solid contents, the nutrition of its walls must suffer from languid circulation, as any muscular organ would that was continually stretched and inactive. Massage improves the circulation and pushes along the contents of accessible portions of the stomach and intestines at the same time, besides directly stimulating the muscular fibres to contraction, and reacting on the nerve-centres, thus improving function and organization in various ways.

For habitual constipation Dr. Sahli, of Berne, advises his patients to roll a five-pound cannon-ball upon the abdomen for five or ten minutes every morning before rising. In this way he has cured nearly all his cases of torpid bowels without medication. When universal peace comes, the orator can therefore speak not only of turning swords into ploughshares, but also cannon-balls into aperients; and peace will then have its victories no less renowned than war.

Much better than using cannon-balls in obstinate cases of constipation is to instruct patients to percuss their own abdomens with the ulnar borders of their fists in the direction of the ascending, transverse, and descending colon for several minutes night and morning. Patients will stand an amount of pounding this way from themselves that they would not from anyone else short of a suit for assault and battery, and the effect is often admirable where laxatives and other means have failed.

MASSAGE AND REST IN CHRONIC DIARRHŒA.

We have always considered that massage was contra-indicated not only in cases of acute, but also in cases of chronic, diarrhœa. At any rate, when at the request of others I have used it either for a local affection not connected with the diarrhœa, or for the improve-

ment of the general condition in those suffering from diarrhœa, it has been invariably without success. Perhaps the failure was due to the fact that I did not dare to use it upon the abdominal organs, as Dr. Eccles has done with good results. The philosophy of his treatment is so sensible, and the results so favorable and contrary to expectation, that it is with all the more pleasure we refer to them here. His paper on " The Treatment of Chronic Diarrhœa by Rest and Massage" was read at the International Medical Congress and published in the *Practitioner,* December, 1890, and January, 1891. In it he tells us that one of the most notable features in all cases of chronic diarrhœa is the atony of the muscular coat of the stomach and intestines, probably brought about by the development of alkaloids, the products of decomposition, which also produce not only nervous symptoms, but to some extent anæmia, fatty degeneration, and emaciation.

Whatever may be the condition on which the production of these alkaloids depends in acute stages of the disease, there exists in the more chronic a want of tone and an atrophy of the stomach and intestines, involving both mucous and muscular coats, with consequent diminished absorption and deficient muscular action, so that the food remains in the stomach for a longer period than is necessary for the normal processes of digestion, while the gases resulting therefrom are not subjected to the pressure normally exercised upon them by the healthy muscular coat of both stomach and intestine. By reason of the non-evacuation of the stomach in due time the process of peptic digestion is not arrested; its action upon albuminoid substances probably results in the constant diminution in size of albuminoid molecules until these are no longer fitted for absorption and subsequent synthesis in glands, blood, and tissues.

Dr. Eccles made the very interesting and instructive experiment of administering milk, over-peptonized until it had become bitter, to a patient suffering from chronic diarrhœa, and there resulted flatulence, intestinal colic, and loose, sour-smelling dejections. He relies on the salol test, its reaction in the urine occurring simultaneously with its passage out of the stomach. In healthy people this occurs about forty-five minutes after a meal, but may be hastened by massage. In cases of chronic diarrhœa no improvement in body-weight was observed when the test failed to give the reaction within three hours. The progress of his cases and the existence of

diarrhœa were measured by the rapidity or slowness of the absorption of salol. Rest of mind and body and physiological rest of the gastro-intestinal canal were enjoined. Diarrhœa itself is a symptom of pathological unrest. Bodily exercise and fatigue are followed by increase of diarrhœa. Absolute rest is necessary for those who are much prostrated; but for those who are not massage is of value in overcoming the evils of rest.

In several cases of sprue treated by Dr. Eccles the result was all that could be desired. Before undergoing the rest and massage treatment every attempt to improve the regimen was attended by increase of white discharge from the bowels and a return of the ulcerative patches characteristic of the disease. In no set of cases has he found massage produce more markedly beneficial results. The number and duration of the *séances* depend upon the requirements of each case. Frequent examination of patient's abdomen alone affords reliable indications as to dosage. Generally speaking, he found it advisable to use massage of the abdomen three times daily at least, the duration of each application depending upon the results sought to be obtained. In the less serious cases he gave massage for ten or fifteen minutes within an hour after meals; in more serious cases massage should be used both before and after meals, with or without firm kneading of the shoulders and back. In the early stages of the treatment general massage of the body is given once a day; and as the food taken and strength and weight increase, massage of the whole body is given twice daily. (It would take but a few patients of this kind to occupy the whole time of a physician *masseur,* and these ought to be as rich as Crœsus to be able to remunerate him for six or eight massages a day. In the United States it is customary to slack up treatment as the patient improves.)

In dilatation of the stomach and chronic dyspepsia massage has proved of great benefit, the distressing symptoms disappearing and the patients gaining flesh and strength. It should be applied as much as possible over the stomach, working from the left side upward and inward under the false ribs, so as to empty the stomach of its contents, whilst stimulating the contractility of its muscular walls. The effect of gravity causes the food to lodge at the most dependent portion in the greater curvature, and it needs to be pushed along towards the pylorus whilst the peristaltic action is being increased.

The whole abdomen should be *masséed* at the same sitting, as the bowels are usually sluggish in these cases. Rubens Hirschberg, of Odessa, reports numerous cases of this kind which he relieved or cured by massage, and lays special stress on the fact that massage has an ultimate chemical influence in causing the disappearance of sour, burning eructations, fetid breath, and bad taste in the mouth, as well as sensations of weight and fulness, which would indicate an improved state of the gastric juice and better contractions of the stomach. Hirschberg invariably found in these cases that massage of the abdomen for thirty minutes increased the daily quantity of urine, in some cases to three times the usual amount, without any other inconvenience than the necessity of frequent micturition. When massage was discontinued the urine fell to its former quantity. The increase of urine probably depended upon more active absorption of fluids from the digestive tract, increased blood-pressure, and stimulation of the splanchnic and pneumogastric nerves below the diaphragm caused by the massage. Contra-indications to the use of massage upon the stomach would be symptoms of cancer or ulcer, acute or febrile states, and suspicions of a tendency to hemorrhage. If cicatricial contraction of the pyloric orifice existed, massage might increase the dilatation, for the walls of the stomach would in all probability yield more readily than the cicatrix.

In chronic gastritis with dilatation of the stomach and stagnation of its contents, Dr. Turck, of Chicago, resorts to massage of the stomach inside and outside with good effect. For the internal massage he employs an ingenious device of his own, called a *gyromele,* which consists of a rubber tube with a flexible steel cable running through it, to the distal end of which is attached a sponge. Through the tube are injected two ounces of soapsuds, and then the handle is turned and the interior of the stomach swabbed, which not only gives it massage, but cleanses it at the same time. The sponge can be withdrawn and the material adherent to it can be examined microscopically and otherwise.

Just after a meal, when the sluggish stomach is distended with food, it is much more accessible to external pressure, and then its contents can be *masséed* into the small intestine, where digestion is much more perfectly carried on. This is best done with the patient in the recumbent position, and is the plan resorted to by Dr. Turck.

But except in thin people massage of partly accessible internal organs, such as the liver, the stomach, and uterus, is neither so easily nor so effectually accomplished as many try to make out.

In order to obtain a mixture of the pancreatic juice, the bile, and the succus entericus, Dr. J. Boas, of Berlin, rubs the abdomen from the region of the right hypochondrium towards the median line after the stomach digestion has ceased and that organ is empty. This procedure gradually relaxes the pyloric sphincter, and after a time the intestinal juices enter the stomach in considerable amount. These are then withdrawn by the stomach-pump. The amount of secretion thus obtained in twenty cases was on an average from forty to fifty cubic centimetres for each.

Many years ago the writer *masséed* a patient who suffered from emphysema of the lungs, together with obstinate constipation. Besides general massage there was given special massage of the abdomen and liver, with percussion over the latter and pressure upon the chest-walls during expiration. Under this treatment alone the stools, from being of a pale color, became natural and occurred twice daily, respiration was easier, sleep and appetite improved, and the general condition was much better.

Straining during forced inspiration, as in lifting heavy weights or in difficult defecation, has been assigned as an exciting cause and, by its continuance, an aggravation of pulmonary emphysema in those predisposed thereto. However that may be, certainly the opposite condition is induced by massage. The pulmonary circulation, obstructed by the dilated air-cells, the dilated hypertrophy of the right ventricle, the consequent hinderance to the outlet of the circulation from the liver and backing up of this in the portal vein, will only in part be relieved by massage or any other means that will facilitate and increase the area of the systemic circulation. In the case just mentioned ordinary exercise aggravated the symptoms.

As a necessary preliminary to the solution of biliary calculi, fracture of the crystals must occur. This is often effected on the part of nature by the movements of respiration and of the abdominal muscles, which cause more or less attrition and breaking of the edges and corners of the crystals, and thus permit the solvent action of the bile. This process may be aided by manipulation of the gall-bladder through the abdominal walls. Faradization has been recom-

mended for this purpose, but it must be evident that massage carefully applied would do this much better. For attempting the disintegration of an impacted biliary calculus Professor Bartholow recommends that firm friction be made with the fingers along the inferior margin of the ribs and towards the epigastrium and umbilicus, whilst the opposite side posteriorly is supported by the hand spread out and firmly applied.

Massage has had to prove its usefulness and make its way in the face of the utmost difficulties after the failure of other means. One of the latest and most striking discoveries in this line is that of Dr. Ernest Gallant, of New York, who has found massage not only safe, but very advantageous, as early as thirty hours after abdominal operations.* After the failure of laxatives, enemata, and the use of the rectal tube, he has been able in all the cases he has reported to relieve the bowels of their painful distention and cramps from gas, and he is sure that in this way he has saved life. Massage over the ascending, transverse, and descending colon was followed by the escape of gas, affording the patient great relief and comfort in the course of ten or fifteen minutes. Changing the patient from the back to the side was also found useful in taking the "kinks" out of the bowels. Infection of the line of union or damage to structures involved in the operation Dr. Gallant thinks is not likely to occur from the use of massage thirty hours after the operation. The cases reported were for operations on the uterus and ovaries and for appendicitis and hernia.

MOVABLE KIDNEY.

Massage and rest combined with suitable exercises and the wearing of an abdominal support have given good results in patients suffering from movable kidney, and when these have not afforded sufficient relief they have put the patient in a more favorable condition for operation than they would have been without such treatment. In these cases the massage should be done mostly with the patient in the Trendelenburg position, pelvis and thighs elevated, chest and head lowered at about an angle of forty-five degrees.

Fellner speaks highly of the good effects of abdominal and pelvic massage for the cure of movable kidney. Of ninety-eight cases of

* Matthews's Quarterly, July, 1896.

this affection he used this treatment in forty severe ones, and found that the disagreeable feelings were removed and the kidney resumed its natural position in all but two patients. In eleven cases, five of which are minutely detailed, the good effects were observed a year or two after. Of the ninety-eight cases all were women. The affection occurred sixty-seven times in the right side, fifteen in the left, nineteen double. Sixty-seven had given birth to children, and of these forty-eight were multiparæ. In fifty-three cases there were also pelvic troubles. An acute injury seemed to be the starting-point in five. There were digestive disturbances in thirty-eight, and disturbances of the intestinal functions in fifty-nine. In many there was frequent urgency to urinate; in two cases there was intermittent albuminuria, and in two hydronephrosis.

Fellner points out that it is not right to call every movement of the kidney, upon breathing, movable kidney, because every kidney has physiologic movements. Naturally, it is only when decidedly out of place and causing disturbance that attention should be directed to it, and from an examination of two thousand nine hundred cases for movable kidney he certainly has the right to speak authoritatively. With kidneys unduly movable, neurasthenic symptoms were often present—palpitation of the heart, anxiety, difficulty of breathing, feelings of oppression, nervous cough, *globus,* dizziness, and fainting, and sometimes melancholia. In all the cases treated by massage the patients were relieved of their discomforts during this treatment, and the objective results were also evident.*

In the *Lancet* of January 29, 1898, Dr. A. Symons Eccles gave an interesting report of the treatment of movable kidney by means of mechanotherapy. Since 1892 twenty-one cases of floating kidney attended with local pain and tenderness have come under his observation and treatment. Of the twenty-one patients five were greatly improved by abdominal massage, exercises, and the application of a pad and belt, and one of these has been free from all discomfort for five years, another for two, whereas both had before suffered from pain and general disturbance at intervals for prolonged periods. Sixteen have been treated by "the rest cure" for periods ranging from fourteen days to eight weeks, and of these seven were lost sight of within four months after treatment, one was a com-

* Wiener medicinische Wochenschrift, 1896, p. 398.

plete failure, and eight he has recorded in detail, having selected them as typical of the varying conditions under which, in males and females, movable kidney may give rise to very marked suffering, often without any knowledge on the part of the patient that nephroptosis existed or could cause the gastric, hepatic, and nervous symptoms of which they complained. The results obtained in these twenty-one are for the most part so satisfactory that they bear favorable comparison with records of those treated by operation, and in view of certain cases which have occurred there is something left in favor of employing milder means for the relief of nephroptosis than surgical interference involving either nephrorrhaphy or nephrectomy. Early diagnosis, reposition, and the maintenance of the organ in its normal place by methods which also conduce to the improvement of general health would appear to go far towards the relief of the patient from the necessity of having the kidney stitched into its place or removed from the body, as the advocates of early operation advise.

At any rate, sufferers from freely movable kidney should first be subjected to treatment by rest and massage, followed by exercises devised for improving the muscularity of the abdominal walls, before they are exposed to the risks which exist, however small they may be rendered by the skill of the operator. No harm arises from the delay which may be fairly entailed by the "rest cure," and if any local surgery should afterwards prove to be necessary because of failure to relieve pain by the means here advocated, the sufferers will be rather better than worse able to undergo the operation. Especially does this appear to be the case when it is remembered that the best results obtained after operation can be secured only if we should keep the patient lying in bed for at least six weeks, no matter whether the wound has healed by first intention or not.

In these cases of floating kidney, no less than in other forms of enteroptosis with so-called functional disorders of digestion, the indications are to restore healthy tone and to induce the redeposition of fat and flesh to the abdominal walls, as well as to improve the nutrition of the viscera and replace the packing material of fat, which in many cases has vanished. This in most instances can be done by judicious combination of frequent massage of the abdomen and loins, carefully regulated diet, and finally gradually increased exercise, precautionary measures meanwhile being adopted by pos-

ture, rest, and mechanical support to prevent and counteract the tendency to displacement and undue mobility engendered by lack of proper support for the viscera.

Several cases of pleuritic effusion, where the absorption of the fluid was accelerated by percussion upon the chest-walls, have been reported by Dr. Emil Schlegel in the *Allgemeine medicinische Central Zeitung,* No. 20, 1885. For this purpose the ulnar border of the hand was used, striking at the rate of two blows a second, or six hundred in five minutes. Two *séances* were given daily. Schlegel believes that percussion might be quite as useful for promoting absorption in other parts of the body, as the intracranial cavity, spinal canal, etc., which are not directly accessible to manipulation. But as the walls of these cavities are unyielding, the blows would have to be so strong that the patient would probably object.

At a meeting of the Royal Medical and Chirurgical Society, a report of which appeared in the London *Lancet* of December 18, 1875, Dr. Brinton pointed out that of six hundred cases of intestinal obstruction forty-three per cent. were due to intussusception, and of these thirty to forty per cent. terminated favorably. Dr. Brinton stated that the operation of gastrotomy for the relief of these cases is only of value in the earlier stages of the affection, when the condition is one of obstruction and not of enteritis. The question was very appropriately asked whether such a dangerous operation as gastrotomy would then be justifiable in a disease of which the proportion of cases of recovery by other means was so high. A full account of a case of "intestinal obstruction of five days' duration cured by kneading after injection per rectum" is given in the London *Lancet* for July 27, 1872. The patient was an adult and a free liver. To the right of the umbilicus and above it there was distinct hardness which gave the impression that a transverse coil of the bowel could be felt above bending upon a vertical one below. The vomited matters were brown, with flocculi of a darker color, but not stercoraceous. Anodynes, hot fomentations, and injections had been thoroughly used, but no relief was obtained until the abdomen was kneaded by Surgeon Brookhouse, of Deptford, who attended the case. The reporter, Dr. Fagge,* remarks:

* Loco citato.

"It can hardly be doubted that the life of the patient was saved by the kneading of the belly, and so satisfactory an issue may well encourage other surgeons to adopt a similar procedure. Yet it cannot be denied that too forcible manipulation of the abdomen might in many instances involve great risk of tearing through parts softened by inflammation or sloughing, and thus counteract the curative processes of nature. There was nothing in the symptoms of the case that indicated the special application of kneading." According to Dr. Fagge, massage saved this patient's life when there were no indications for it. What, then, will it do when there are indications for it? Certainly no one of any sense would think of using massage if it could be made clear, or even if there were any doubts, that enteritis had set in or that there was danger of sloughing. The manner in which massage was used in this case is not stated, but when the condition is one of obstruction alone, what mechanical agency can be more likely to disperse a mass of fæces and push it through a constricted opening, or pull out a portion of invaginated intestine, than massage suitably applied? It seems to me that the indications for kneading at this stage are special, and that the best manner of doing massage here would be by gentle stroking and kneading at a short distance beyond the distal or rectal end of the mass, and in the course of the intestine towards the anus, continuing to work in the same direction, and gradually proceeding backward upon the tumor. In this way the intussusception would be most likely to be pulled out, the mass of fæces broken up and pushed along in their natural course. Until this milder procedure has been thoroughly tried no patient should be vivisected, for it is only in the same stage of the affection that either massage or surgical interference might be effectual. Massage has been effectual in every instance that we have heard of, but it may have failed in a great many more that we have not heard of. How often has it been tried?

Dr. C. P. Putnam * has reported a case of intussusception of the large intestine in a child five months old successfully treated by injections and massage. A cylindrical tumor about three inches wide and one and one-quarter inches in diameter was felt between the umbilicus and left costal cartilages. Gentle massage was applied to the tumor with the intention of diminishing the hyperæmia

* Boston Medical and Surgical Journal, April 21, 1881.

and œdema, and possibly of reducing it. Under this treatment the tumor became softer and shorter. Water was then injected into the bowel. This was at ten P.M. In the morning the patient passed three bloody stools, and the tumor was again found as on the previous evening. A repetition of the same procedures was successful, and the patient recovered.

Buch * has used massage in four cases of intussusception successfully, the patients recovering. One was a case of strangulation at the ileocæcal valve, whilst the other three were regarded as invaginations. In these conditions it is considered impossible to fix the place of strangulation unless the tumor formed by the arrested matter can be felt. Then massage is used from above downward in the track of the intestine, at first attempting to push the fecal mass past the constriction, and then stretching so as to remove the invagination. When the seat of the constriction cannot be located, it is not a contra-indication for the employment of massage. It is always advantageous to displace the fecal mass and to remove it to another part of the intestine. By this means it is broken up into small parts, so that purgatives succeed better in expelling them by peristalsis and hyperexcretion. It is impossible for an intestine greatly distended to contract.

One of Buch's cases was that of an innkeeper who had always been in good health. No movement of the bowels had taken place for four days. The patient was suffering violent abdominal pain, alternating with vomiting, there was meteorism and dyspnœa, and the countenance was expressive of great anxiety. Above the umbilicus on the left there was a swelling in the form of a large pudding, having its convexity directed upward. Massage was used so as to propel the anal extremity of this onward and then was gradually extended farther upon it until no trace of it was left. Several hours afterwards the patient had a copious dejection (*une riche garderobe*) and the next day was up and well. Another of Buch's cases was that of a lady who had not had an evacuation of the bowels for thirteen days, and who vomited everything she took. There was no hernia nor swelling. An œsophageal sound was introduced by the rectum so that it could be felt in the epigastric region, then an

* Berliner klinische Wochenschrift, October 11, 1880. Norström, Du Massage, 1884.

abundant injection of ice-water was given, which came away in two hours, but no fæces with it. Another examination revealed a movable elongated tumor commencing at the right inguinal region and extending towards the left. It seemed probable that this was the inferior part of the small intestine and that there existed a constriction at the ileocæcal valve. The walls of the abdomen being thin, there was no difficulty in pushing along the distal extremity of the mass, and this was *masséed* until no more of it could be felt. With the aid of aloes she had her first dejection thirteen hours after massage, and recovered.

In *L'Union Médicale* of March 18, 1882, Bitterlin reports two cases of intestinal obstruction with vomiting of fecal matter which were treated with massagé and got well. The author concludes by saying that he " considers it his duty to publish these cases in order to show that in obstruction of the intestine massage of the abdominal region can bring about quite unlooked-for results when other means have failed. Before having recourse to such extreme measures as puncture of the intestines, enterotomy, or gastrotomy, operations which are always of a certain gravity, it is important to try massage, which can effect cure in the most desperate cases."

Scerbsky, in the *Petersburger medicinische Wochenschrift,* 1878, reports the case of a boy, six years old, who had all the symptoms of an invagination—tumor in the form of a pudding in the left iliac region, violent pains in the abdomen, vomiting, meteorism, tenesmus, and collapse. After having tried injections and purgatives in vain, the intestine was punctured to let out the gas, then the swelling was *masséed* with great care on account of the pain. At the end of ten minutes something was felt gliding under the fingers, and there was heard at the same time the gurgling of flatus and the pain ceased. Abundant vomiting followed, then the child went to sleep, and when he awoke all the unfavorable symptoms had disappeared. During the night there were copious stools, and cure resulted. Krönlein reports like favorable results from massage in intestinal obstruction. (Reibmayr.)

Dr. Kriviakin warmly advises deep massage of the abdomen as a powerful curative means in cases of intestinal obstruction. He has reported four cases in which the symptoms were obstinate constipation, agonizing paroxysmal abdominal pain, fetid vomiting, obstinate hiccough, offensive eructations, and distention of the

abdomen. *Séances* of fifteen minutes every hour and a half were employed. As a rule one sitting was sufficient to produce stools. Recovery resulted in three of the cases; and the fourth was that of a decrepit, weak man, regarded as hopeless before massage was tried. But, notwithstanding this, in about half an hour after the first massage there was a free discharge of fecal lumps suspended in fluid. The patient was in a semi-comatose state, with cold, viscid perspiration, fetid vomiting and eructations, filiform pulse with constipation of twelve days' standing before massage was begun. After massage collapse became worse, and five hours later the man died. No autopsy. According to Kriviakin, deep massage is indicated in intestinal obstruction of every kind and description.*

A case of induration of the cellular tissue around the kidney with rebellious neuralgia of the leg, the sequel of perinephritis, was cured by massage at the hands of Dr. Winiwarter. The patient was a vigorous, corpulent man fifty-eight years of age, whom Professor Lobel sent to Winiwarter to be treated with massage. He had suffered from violent neuralgic pain in the left leg for five years, and this had resisted all sorts of treatment, and for the last two years his life had been passed between his bed and table, and he was obliged to keep absolutely quiet as much as possible, for he could only repose lying on his back. Sitting, standing, or walking precipitated paroxysms of pain which even occurred without change of position to the number of sixty a day. He could take a few steps supported by a cane and by one of his domestics. The pain radiated over the external surface of the thigh to the knee, and it was also felt in the toes. Except wasting of the muscles of the limb and hip, nothing was observable; pressure upon the sciatic nerve at its exit did not excite pain. Over the region of the left kidney there was found a flat, uneven swelling which was difficult to palpate on account of its deep situation; it was firm and elastic, and over its middle pressure afforded an obscure sense of fluctuation. It was not sensitive to pressure except at a clearly defined point (not stated where), pressure upon which excited the severe neuralgic attacks in the thigh. The skin covering the swelling, though thick with adipose, was not adherent nor altered. Five years before Winiwarter saw the patient the latter had suffered from a febrile

* London Medical Record, August 15, 1885.

attack with violent pains in the renal region, from which he recovered, but the pains persisted and assumed a neuralgic character. It was considered that the continuance of the trouble was owing to an exudation similar to what is found after periuterine inflammation, and that the pains were due to a compression of the lumbar plexus by this exudation, and that they were radiated from the lumbar to the sacral plexus. This view was concurred in by Professor Billroth, who saw the patient. The treatment was daily massage of the limb, hip, and lumbar regions. At first this was painful, but in fourteen days the painful places had disappeared, and the patient began to take a few steps without support, and the paroxysms of severe pain occurred only once or twice during the day. After sixty-four days the improvement was so great that he departed on his homeward journey. The tumor had then become very small, and fluctuation could not be felt; firm pressure upon its surface was still a little painful, but excited no attack of neuralgia. The patient took a walk of three hours every morning, and could get in and out of a carriage and stand upon the left leg. A melancholy state of mind had disappeared.

Observations are beginning to indicate that in the incipient stages of appendicitis the attack may be warded off altogether, and the patient get well by massage of the abdomen, especially over the region of the cæcum. In chronic typhlitis and perityphlitis Dr. George Hünerfauth,* of Homburg, has found massage of great value. He points out that the cause of typhlitis is usually mechanical, the mass of fæces remaining too long in the cæcum on account of relaxation of its muscular coat, change of its position, and chronic catarrh, against all of which massage would prove a valuable prophylactic as well as a curative measure. Of course, this treatment has nothing to do with cases of abscesses or burrowing of pus. But for the removal of chronic thickening and adhesions affecting the cæcum and vermiform appendix, or their surroundings in the peritoneum and areolar tissue, the residue of typhlitis and perityphlitis, massage has been in his hands the most effectual agent. Indeed, his fifty-three cases treated in this way are sufficient to support him in the assertion that permanent improvement or recovery in severe cases of this sort can be obtained only by means of massage.

* Münchener medicinische Wochenschrift, Mai 14, 21, 28, 1889.

He applied this to the abdomen for fifteen to twenty minutes twice daily. Mild cases required six to eight weeks of this treatment, severe ones three to four months. With it was combined a regulated diet and sometimes the mineral waters of Homburg. Massage had to be proceeded with in the most careful manner in these cases. Sometimes only gentle, firm pressure can be used at first; but after a brief period sensitiveness disappears, stools improve, and tympanitis decreases, and then firm, deep working can be employed to act upon indurated connective tissues and adhesions. With the removal of a long-continued tympanitic condition the disturbances dependent upon it cease, and the patient becomes cheerful, sleeps better, breathes easier, and the heart when disturbed resumes its normal action. Exercise must be indulged in with great caution, and dancing, swimming, and mountain-climbing must not be attempted for a long time, for the right ileocæcal region in the majority of cases is apt to remain a *locus minoris resistentiæ*.

A military surgeon suffered from an attack of peritonitis (*peritonite stercorale*) in 1875, and again had two similar attacks in 1877. After the last pain was continuous and aggravated by motion, and there was a disagreeable sensation of heaviness, which was accounted for by a hard tumor of the size of a goose's egg in the ileocæcal region. This itself was but slightly painful to pressure. There was no constipation. The case was one of old inflammatory exudation from the peritoneum when first seen by Dr. Weissenberg, three years after the last attack. The treatment had been by drinking mineral salts and by the local application of the same. Dr. Weissenberg made energetic use of massage, and then amelioration became manifest and was continuous, and all the symptoms terminated in cure, so the surgeon did not have to leave the service, as he feared he would.* These cases illustrate the increased capacity for resorption of the peritoneum under the stimulus of massage, and show that this agent exerts a similar influence upon indurations and exudations wherever they can be reached by it, whether around uterus, kidney, intestine, or other places. For enlargement of the spleen, kneading with the hand is a very old remedy, especially in the West Indies. But we have yet to learn how much benefit results from it.

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* Berliner klinische Wochenschrift, No. 17, 1880.

Taxis for the reduction of hernia is a sort of external massage requiring skill, tact, and care; and the dilatation of strictures is an internal massage which can be improved on by combining with it external massage where the stricture is accessible to this. In stricture of the urethra each of these methods has had its advocates; thus Bardinet made use of internal massage alone by the repeated introduction and withdrawal of a sound, while Professor Antal employed external massage alone with success in impermeable strictures with periurethral indurations.* Professor Antal gave daily massage from eight to ten minutes, and good results were gained in from three to eight days, the callous tissue disappearing and the constricted urethra admitting of the passage of larger sounds. Internal massage acts only upon the thin layer of tissue immediately surrounding the urethra; external massage causes absorption of the entire hyperplasia, and might often be used in preference to urethrotomy. The external method employed by Professor Antal is of special value in those cases in which the urethra will not admit of the passage of a bougie. Massage of the pendulous portion of the urethra presents no difficulties, according to Antal, but that of the membranous and prostatic portion can be done only through the rectum.

As soon as a bougie can be introduced this forms a good substratum for massage to be used over the stricture. This combination ought to work well.

Dr. Le Ritter, a Dutch surgeon, says he has completely cured two patients, aged fifty years and seventy years, of retention of urine due to enlarged prostate. The forefinger was placed in the rectum and the prostate moved from right to left and vertically three times each way, and afterwards it was firmly rubbed. This is disagreeable and cannot long be tolerated at a time. In both cases a small quantity of blood passed from the urethra caused by the manipulation, for which liquor ferri sesquichloridi was given until a satisfactory result. In one of these cases twenty *séances* were required, in the other fifteen, to enable the patients to urinate freely.†

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* Centralblatt für die gesammte Therapie, July, 1884.

† British Medical Journal, August 1, 1885.

XIII.

Massage in Affections of the Central Nervous System.

MASSAGE AND MOVEMENTS IN HEMIPLEGIA.

> When minds are joyful, then we look around,
> And what is seen is all on fairy ground;
> Again they sicken, and on every view
> Cast their own dull and melancholy hue.—CRABBE.

Of all the discouraging cases that come to us for relief there are few more hopeless than the hemiplegics, and yet when we are so fortunate as to see one recover under our care we hope that we have had at least something to do in producing such a favorable result, for the patient is apt to give us all the credit, though we may be modestly and silently loth to accept much of it.

The benefits that may result from massage or any other remedial measure in disturbances arising from morbid changes in the central nervous system or in any part of the body will depend more on the nature of these changes than on the merits of the treatment, however appropriately and skilfully it may be employed. So many variations are seen in the course of paralysis of so-called organic origin that the influence of massage in modifying these is difficult to determine, even if it were judicious to make use of this treatment from the commencement. When paralysis of central origin has come on suddenly, I prefer to abstain from the use of massage until the perturbation in general has subsided and the patient has become somewhat accustomed to his unnatural condition. But in the meantime, while thus waiting to spare the nerve-centres any supposed extra commotion, the peripheral pathological changes are gaining ground which later may only be imperfectly overcome. These are: interference with the supply and return of the circulation, owing to the accelerating influence of muscular contraction and relaxation being absent or diminished; and, as a result of this, variation of temperature, usually lowering, and passive hyperæmia or ischæmia; hypertrophy of interstitial connective tissue with, in time, subsequent cicatricial retraction, giving rise to contractures and atrophy of the muscular fibres; formation of adipose tissue or fatty degen-

eration; in a word, vasomotor and trophic disturbances. These are all rational indications for the use of massage, either as a preventive of such changes or as a palliative of them when they have taken place. But if the nerve-centres are impaired beyond recovery or secondary pathological changes have occurred, the prospect of benefit cannot be encouraging.

My own experience of massage in a number of cases of paralysis may be briefly stated by saying that, in the absence of severe pain, obstinate contraction, or tonic spasms, this agent has proved useful in improving the circulation, temperature, and comfort of the parts affected. When in paralysis of spinal or cerebral origin recovery has followed under manipulation, we had previously supposed that the central disturbance had entirely passed away, and that the force of habit was the main factor that continued the external manifestations of inaction; and thus massage would have served a useful purpose for diagnosis as well as treatment. But the more recent experiences and opinions of Professor Zabludowski and others well qualified to judge teach us that it is possible by means of massage and gymnastics to educate other parts of the brain to take the place of the injured ones by arousing psychomotor impulses in the formation of new associations and combinations; so that we need no longer regard paralysis of either central or peripheral origin from the hopeless stand-point that we formerly did.

However that may be, when the causative conditions have ceased paralyzed muscles will not at once resume their former natural condition. Massage, passive and resistive movements, restore them to a sense of existence, enable them to recognize the power they still possess, and educate this to a higher degree; and, at the same time, such treatment affords the *only* means of judging of the capabilities of the patient and of telling him how to use them. Sometimes the patient will make better motion against resistance than without it. This seems to give a sense of support and consciousness of power. Interlocking the fingers of one hand with those of the other, so that the well arm can raise the paralyzed one, is a most excellent device, encourages the patient, and educates the unimpaired centres to supplement the deficiency of the injured ones. This should be repeated regularly,—six to twelve times, three times a day. Massage, if used early in these cases, would diminish the evils of inactivity upon the circulation and nutrition and keep the

muscles in a state of readiness for voluntary contraction. It is when there is only partial impairment of motion that massage will be likely to lead to recovery. And when improvement or recovery does follow, it will be difficult to determine whether the exciting cause of the trouble has passed away or whether we have trained other parts of the brain to do the work of the injured ones. In either event our best neurologists are beginning to think that the patient ought to have the benefit of the doubt by a vigorous persistence and long continuance of the treatment by massage and gymnastics.

Mr. L., fifty-eight years of age, had been a vigorous, healthy man. He had been much worried with reverses in business. While at breakfast one morning he had an uncomfortable sensation in his head, with slight loss of motion in the left arm, leg, and side, which gradually increased for two or three days. He kept in bed for four weeks, and for six weeks afterwards the affected parts were quite helpless and his face was drawn to one side,—the left. Improvement was gradual, and at the end of a year, when he came to me, there was a lack of control over the arm and leg, with stiffness and awkwardness in using them; but if he slipped on the sidewalk, he could use either with alacrity to regain his balance. This patient had massage nine times in three weeks, and the result was: That he got rid of uneasy feelings in his head; his power of endurance and freedom of motion greatly increased; his digestion, which was previously feeble, became strong; and he looked more robust, bowels became regular, and urgent desire to urinate disappeared. The arm and leg could be used almost naturally. At first he felt remarkably well after the massage, as if moderately stimulated. Later he experienced an agreeable languor from manipulation, and he thought he was being too much "mesmerized."

Three months ago there came to my office a patient thirty-six years of age and weighing one hundred and fifty pounds. With the aid of a cane she walked rather awkwardly in a manner characteristic of hemiplegia. Seven months before this I met her out walking, the picture of health, and two days later she was attacked with hemiplegia. It was about four o'clock in the afternoon, when she was sitting, and she tried to get up for something that she wanted, and found that she could not stand. She was not unconscious, but somewhat dazed. She was put to bed, and later discovered that the

left leg was numb, and she had difficulty in moving it and the arm and side. The attack was preceded by severe headache for a day or two, with boring and buzzing and feelings of pressure in the head, which lasted for four hours after the shock and then disappeared. She got up the following morning, but soon went back to bed again and stayed there for three months. A week after the attack speech and deglutition became impaired for several days. Speech returned suddenly, but she stammered for several weeks. She did not lose control over the bowels and bladder, but the bowels had to be moved by injection, and she passed but little urine. For three days she was fed on liquid diet.

Before this attack she used to walk often in her sleep. Two years before it she walked quite a long distance from home one night and went out on the rocks at the seashore. A dog barked and woke her up, and then the rocks hurt her feet, so that she had difficulty in walking back upon them. One night during the three months that she was confined to her bed she read a long article aloud in the dark and made uncomplimentary but thoughtful remarks upon it. Her husband and the nurse, who heard her, thought it was something that she had committed to memory and was reciting.

When she came to me she had headache nearly all the time on the left side in the parietal region and a numb feeling on the right. She was also subject to nervous spells, which occurred from once a day to once in two weeks. In these the right leg would tremble so severely that she thought it would dislocate itself at the hip-joint. If she did not succeed in getting asleep soon in one of these spells, her headache would increase, and she could read and write in the dark, though she had no recollection of what she had done. In two months there was almost complete loss of motion and sensation in the left leg.

She had been treated for some time by iodide of potash and strychnia and had improved much. The strength and motion of hand and arm were little less than normal; of the thigh, for flexion and extension, abduction and adduction, only about one-fourth of normal; of leg below the knee, for flexion and extension of foot, strong and natural, which was in marked contrast to the behavior of the motion of the thigh. Sensation perfect everywhere except a little dull on outside of the thigh. Patellar reflex exaggerated. Pupils normal to light and distance. Pulse 72, and heart seemed

normal, though she reminded me that I found something the matter with her heart a year before which disappeared while she was a subject for the class in massage, and with that disappeared also shortness of breath and difficulty of going up stairs. She could go up stairs and down one step at a time, not step about in the natural way, when she came to me.

The treatment I gave her was massage and resistive movements, and after two visits for this purpose she could push with the leg much more vigorously. After six visits in two weeks she pushed and pulled the leg and thigh with vigor that seemed equal to normal, but there was a slight lack of endurance to the upward pull of the thigh, done by the psoas magnus and iliacus internus. Inversion and eversion of the thigh against resistance had also vastly improved. She walked naturally, and no longer carried a cane for support. She visited me twice the following week, and at the end of the second visit this week she dressed herself in three minutes, and in twelve minutes more she got her train at the North Union Station, a feat that any one of us might envy, for it meant crossing two streets, descending a flight of stairs, and a ride of a mile in the subway car. Two visits more the following week seemed sufficient to confirm the improvement gained in motion, for she could then go up stairs two steps at a time and run on a level. But as her head and neck were not yet comfortable, she came to me once a week for three weeks longer for special massage of these regions, which were tense and indurated. The tissues here became of natural suppleness and elasticity and the headaches entirely disappeared. Her whole period of treatment with me was seven weeks, and at the end of that time, and now also, she is so well I trust she will continue to remain so.

This is a case that would doubtless delight the heart and mind of the modern neurologist, for he would probably find in it ample scope for the imagination to study and speculate upon somnambulism, hysteria, and paralysis; the causation and disappearance of these through the peculiar behavior of the naughty neurons in forming illicit connections and disconnections without the knowledge or consent of their owner. Possibly this patient might have been cured by suggestion alone; but suggestion is much more effectual when accompanied by something tangible and sensible, whether it be massage and exercises for impaired motion, or a good spanking

for a naughty child, or feeding the starving heathen before Christianizing them.

The theory by which one part of the brain can take the place of another when diseased has been formulated by Broadbent somewhat as follows: Movements are represented in the opposite hemisphere in proportion as they are unilateral, in both hemispheres in proportion as they are bilateral, in execution. Either hemisphere can excite the bilateral movements, but only the opposite can excite the unilateral ones. Movements rather than muscles are represented in the hemispheres and are lost in disease. Lateral movements by muscles of both sides are represented in both hemispheres, but in a normal state they are chiefly affected by the opposite hemisphere. When this is diseased they are impaired until the hemisphere on the same side has acquired functional power over them through mechanisms before existing, but unused.

We want more light on the manner and ways by which functional power may be acquired by means of mechanisms previously existing, but unused, in the brain. We know that a man can get along very well with one eye, one ear, or one testicle, and it would be rather remarkable if one side of such a vastly more important organ as the brain should not be capable of supplementing injury to the other or doing the work of both. It would seem to be constructed with such an object in view, with its transverse, its association, and longitudinal commissural fibres. It was a very wise man who said that we do not know how far one part of the brain may supplement another.

The most striking example of injury to the brain with recovery has never to my knowledge been thoroughly studied and analyzed. It was that of the well-known case of the passage of a crowbar through the head, reported by Dr. Henry J. Bigelow in the *American Journal of the Medical Sciences* for September 13, 1848. While tamping a charge of powder, a spark caused an explosion and drove a crowbar, weighing thirteen and one-quarter pounds, three feet seven inches long, and one and one-quarter inches in diameter, through the skull of the patient. It traversed the cranium in a straight line, from the left angle of the lower jaw below to the centre of the frontal bone above, near the sagittal suture, where it emerged. The patient quite recovered his faculties of body and mind, with only the loss of the sight of the left eye. "A sort of an

anterior fontanelle, or circular opening, of three and one-quarter inches in diameter was left behind by the removal of portions of the anterior superior angle of each parietal bone and of the frontal bone.

MASSAGE IN INFANTILE PARALYSIS.—From the Out-Patient Department for Nervous Diseases at the Massachusetts General Hospital Dr. J. J. Putnam sent me Willie P., five years of age, who had had an attack of infantile paralysis (*poliomyelitis anterior acuta*) when ten months of age. But for the diagnosis of an expert, I should have thought the case had been one of hemiplegia, as the history pointed to loss of power in the right side, arm, and leg, the movements of which were still moderately impaired when he came to me, and the nutrition of these parts was little below that of the other side, which was remarkably good. When massage was begun he could not elevate the arm, though there was an attempt on the part of the deltoid which may have furnished one-third of the necessary power. In five weeks he could elevate the arm freely and naturally, and all the other motions had correspondingly increased. Manipulation, percussion, and assistive movements were given for twenty minutes every other day.

One seldom meets with cases so favorable for treatment by massage as this was. The average of improvement falls far below this, but, *where there is any motion at all left, it is likely to be increased by massage and movements.* The following hopeless case represents the other extreme:

E. B., aged seventeen years, had, when two and one-half years of age, an attack of infantile paralysis which completely deprived him of the use of his legs then and since, the only motion left being a feeble effort on the part of the right psoas magnus and iliacus internus, and a moderately persistent contraction of the peronei muscles of the left leg. All the other muscles of the lower limbs were completely atrophied, and his legs were much smaller than his arms; at times cold, moist, and livid, at others warmer and redder than natural. He walked leaning forward on two canes, supported by apparatus on the legs, which were projected forward by a side-swing of the body. He had massage every other day for six weeks, and during the last three weeks the legs maintained a more natural and uniform temperature and color, the skin was smoother and softer, and the deficiency of strength in the psoas

magnus and iliacus internus had increased so that he could flex the thigh alone when the leg was raised, but not against resistance, and the left foot allowed itself to be held in a natural position while the patient voluntarily contracted the peronei, any attempt at which at first only brought on perverse spasmodic contraction with eversion of the foot. Four inches above the middle of the internal malleolus there was a gain of one-quarter of an inch in circumference of the left leg, showing improved nutrition of the muscles in which there was motion, while eight inches above the lower edge of the internal condyles the thighs had lost one-quarter of an inch in circumference, owing to the absorption of fattily degenerated tissue and, perhaps to a less extent, of proliferated connective tissue.

In such cases as the last a warm bath is a good preparation for the massage; then friction and deep manipulation should follow; and when there is no motion in the parts, passive motion should be freely given; when there is slight motion left, but not enough to complete a movement, assistive movements will come into play; when there is returning motion and more than is necessary for simply moving the part to which the affected muscles are attached, resistive motion within their strength will be used; percussion when there is a languid state of sensation, motion, and circulation, and a sufficient substratum of muscles to strike upon, but when there is passive hyperæmia, the less percussion is used the better. We often see cases where one group of muscles is paralyzed and atrophied, granting no response to the will nor to the faradic nor slowly interrupted galvanic current, as, for instance, the anterior tibio-fibular group. Cultivating the extensibility of the opponent group with massage and passive flexion of the foot, together with resistive movements of the whole leg and thigh, made by opposing extension of the leg and thigh, with the opposing force at the ball of the foot, will here be productive of benefit; for in this manner the posterior tibio-fibular muscles will be relieved from their continual state of contraction or retraction, the weak and elongated muscles will be shortened, and both groups will be simultaneously innervated. Medical gymnastics for weak, paretic, or paralyzed muscles are based on the fact that exercise of intact muscles stimulates innervation and nutrition of neighboring impaired muscles, and skill in directing these efforts consists in finding out what patients can do and contriving means for their performance. Massage will prob-

ably prove more serviceable in the prevention than in the cure of contractures, stiffness, and ankylosis, whether of central or peripheral origin. In conjunction with elastic muscles which supplement the loss of power in paralyzed muscles, to aid mechanical contrivances to overcome contractures and to make tissues more amenable to restraint massage proves useful. After section of muscles, when repair has sufficiently progressed, massage is used to advantage for the restoration of mobility. A famous French surgeon, Malgaigne, I think, has styled massage "the soul of orthopædic surgery."

There is a strong sentiment amongst the profession at present, which seems to be gaining ground, that massage when applied early in cases of anterior poliomyelitis will do much to prevent the loss of power and wasting of muscles which are so hard to overcome later. It evidently acts by maintaining the nutrition of the affected parts and supplementing the impaired functions of the nerve-cells in the spinal cord.

And even when the atrophy and loss of power are considerable the opinion seems to be increasing that by the persistent and long-continued use of massage, passive and resistive movements, and voluntary gymnastics the loss of motion may still be recovered from by the will getting down to the muscles in other ways than by the injured nerve-cells. It must not be forgotten, however, that the whole extent of the spinal cells or neurons from which proceed the nerves to the impaired muscles is not always injured. The remaining healthy portions of these anterior-horn cells are in a state of suspension and still capable of having their latent functions revived after the shock and congestion have passed away.

Massage in Locomotor Ataxia.—Cases of locomotor ataxia are benefited by a course of massage from time to time. There is early, frequently after the first massage, improvement in the tone of the muscles, and, later, disturbances of sensibility, anæsthesia, and paræsthesia disappear, and patients are apt to think that recovery will result. In the case of Mr. P., who was about fifty-seven years of age, tendon reflex was absent, there was incoordination in walking, occasional severe attacks of neuralgia, most frequently in his legs, diminished control over the rectum, but not over the bladder, though slight cystitis had long existed. For eight weeks prior to my first seeing this patient he had suffered from weakness, pain, and burning sensations in the right knee,

and after walking a short distance he would be obliged to stop, as the knee behaved, to use his own words, "like an axle turning without grease until it would go no farther." The muscles of this leg were smaller and softer than those of the other, and there were sensations of numbness and constriction, most felt about the knee. Under daily massage for two weeks the disagreeable feelings passed away and the muscles improved in firmness and use, so that in place of walking a square or two he resumed going to and from his business, a mile each way. This patient and his physician, Dr. A. H. Nichols, who kindly referred him to me, were firm believers in remedial gymnastics and exercises *versus* the rest cure. He kept them up with massage pretty constantly for four years, and occasionally a tonic internally, and the result was that he not only held his own, but actually gained in the use of his legs, while a lateral curvature of the spine increased but slightly. This patient sometimes walked off his lancinating pains. Though naturally rather a delicate man, he continued at the head of an extensive business for many years, and by his persistent exercise kept himself much stronger than people in his condition usually are. For the next three years this patient had two or three massages weekly with the occasional use of the faradic current for a few minutes after the massage. He retained his powers of motion much better than we had anticipated, and his general health kept wonderfully good also, notwithstanding an hypertrophied heart and interstitial nephritis. But when on September 3, 1887, he woke up and found that his right leg had given out and that he could not walk at all, it was no more than we had been fearing. He had had no massage for a month before this except some rough and inefficient handling by his man-servant, and both of these may have had some influence in precipitating the loss of power. On examination the leg from the knee down was found to be cold, the muscles were inert and inelastic, and the foot offered much resistance to passive motion, which was limited one-half. There was no power in the anterior tibial muscles to flex the foot, and they gave but a feeble response to a strong faradic current. The muscles of the calf were similarly affected, but to a less extent. Under massage and faradization to the leg, with nux vomica internally, the patient lost ground for the first seven days, the anterior tibial muscles became much atrophied, and there were fibrillary contractions. Percussion

with the finger-tips caused better contractions than did faradization. There was no trouble with the muscles above the knee. The same treatment was continued, and from about the end of the first week there was steady improvement in the growth of the muscles and in the voluntary contraction of them, so that three weeks later when I tied a handkerchief around the ball of the foot and put a spring balance through this the foot pulled in dorsal flexion (by the contraction of the anterior tibials) sixteen pounds, and three days later nineteen pounds; and while they were contracted by the utmost efforts of the patient it required a pull of fifty pounds to extend the foot. At the end of nine weeks he was walking in the house without the aid of crutches and going up and down stairs naturally, and at the end of three months he was walking as well as he had done for several years before the leg gave out. The muscles of this leg had been so trained and cultivated with massage, electricity, and resistive movements that they were really stronger than the other comparatively well leg. Two years later the patient still held his improvement. From the commencement of his spinal symptoms, eleven or twelve years before, he practised daily suspension by means of Sayre's apparatus, besides rowing with elastic tubes on a parlor rowing-machine. The occasional cauterization of this patient's back had been omitted for some weeks previous to the loss of power in his leg; and it was not resumed until he could go without crutches, so that if its suspension had anything to do with precipitating his symptoms, its omission had nothing to do with his recovery, unless to aid it.

If space permitted, I could tell of another locomotor ataxic whose anterior tibial muscles of the right leg lost all power of motion twice within the same year, and each time he regained full strength and control over them in a few weeks under massage, movements, and faradization. Success in these cases was doubtless due to the fact that treatment was begun early, before the nerves and muscles had time to degenerate to any extent, and it might lead us to think that there is probably much more significance to the statement of Dr. William Murrell than we have attached to it, namely, that massage gives good results in recent cases of infantile and other paralyses.

Voluntary movements, such as the patient can make, frequently repeated and long continued have recently been much advocated in

locomotor ataxia, and are called after the name of the man, Fränkel, who has so vigorously proclaimed them aloud. No doubt benefit has resulted by this method in combination with other means, and it has not been inappropriately called compensatory exercise treatment. But its advocates, by cultivating the finer movements first, all seem to forget or ignore the fact that in the natural evolution of the human being from childhood up, the large and easy movements of trunk and upper parts of the limbs come first, the finer and more difficult later. Therefore this ought to be the plan on which to build, and not the reverse. It is of great aid to the patient in the beginning to watch his movements and later do them without looking. But we do not think that this is sufficient reason for immortalizing a man or calling such a method by his name, any more than we would say "God bless the man who invented sleep." Compared with the efficacy of massage and resistive movements in inspiring confidence and restoring motion, I think these voluntary efforts alone fall far behind.

It is certain that massage and movements properly adapted often do restore lost power of motion, and if in disturbances of central and peripheral origin they do this, not only by their local effect, but also, as has been claimed for them, by arousing psychomotor impulses in the formation of new associations and combinations, then they are certainly worthy of more consideration than they have received.

Dr. Zabludowski, of Berlin, reports (*Therap. Monatsh.*, December, 1896) a case of Friedreich's disease (hereditary ataxia), interesting on account of the youthful age of the patient—a girl of nine years—and also because of the successful treatment of the case by massage. The patient was seen by Professor Mendel in consultation with Dr. Zabludowski, and the great improvement which a four-weeks' course of massage effected was witnessed by both. The child then seldom fell, and could walk without deviation, and she did not let things fall out of her hands, as formerly. The choreiform movements were scarcely visible and sleep was quiet.

Fuller, in his "Medicina Gymnastica," 1771, says "there is no reason why many invalids should not be as much stronger than others who are similarly afflicted, as gymnasts are stronger than people usually." The pendulum of fashion is apt to swing to extremes in medicine as in everything else. At present the rest cure

(as some call it) prevails; it may not be long before the exercise cure will be in vogue.* But, however this may be, the skill of the physician will always be necessary to encourage the one or restrain the other. It would be the height of absurdity to advise exercise when locomotor ataxia or any other malady had been brought on by bodily fatigue, at least until a sufficient space of time had been allowed for rest. There is a principle underlying rest and exercise. The phenomena of life alternate in an active and passive manner, individually and collectively; sleep alternates with waking, rest with exercise, muscles contract and relax; walking is a semi-passive means of locomotion by which we partly project ourselves and partly fall forward. Invalids who have been wearing themselves out by repeatedly futile and exhaustive efforts at exercise of mind or body must have a long pause for rest. The most careful judgment is required to properly limit this, to prevent its evils, and to get patients to resume exercise in minimum quantities with suitable intervals of rest, gradually decreasing while exercise is increasing. To preserve the harmony of rest and exercise, and to prescribe the one or the other to suit different conditions, are important and often difficult problems.

Zabludowski, in the *Deutsche medicinische Zeitung,* No. 3, 1884, reports a case of locomotor ataxia in which there was a history of syphilis. After medical treatment had improved the patient to a certain extent beyond which he did not seem to gain, massage was used and the patient improved in a remarkable manner. Schreiber has used massage successfully for the removal of distressing anæsthesia of both gluteal regions in a case of locomotor ataxia (*Wiener medicinische Presse,* March 6, 1881). The case presented well-marked symptoms of the malady,—ataxia, lancinating pains, gastralgia, and paralysis of the sixth pair of nerves. Sensations of temperature and of contact over the hips were so deficient that the patient could not distinguish whether he was seated on a cold stone or on a wooden bench warmed in the sun, nor whether an object was hard or soft, and this state had existed for five months. Schreiber knew by experience that anæsthesias in the course of sciatica yield

* The above was written fifteen years ago, and this prediction is now more than fulfilled, at least in the United States, for men, women, and children in all conditions have taken to exercising as if their lives and salvation depended on this alone.

to massage. Although it had been generally considered with regard to tabes that a *noli me tangere* course is the best so far as manual intervention is concerned, yet he resolved to try massage in the most careful manner. He soon found that it caused no unpleasant effects, and he therefore used it vigorously every day for twelve days with final and complete relief to the patient, which still continued three months afterwards. The patient kept notes of his case. November 15, 1880, after the fifth massage, he experienced a disagreeable tension in the parts *masséed* which rendered the ascent of stairs difficult. November 18, tension had disappeared and the strength of the muscles increased. 19th, slight sensation, could feel where he was seated, whilst before it seemed as if there were a foreign body between him and a seat. 20th, sensation increased and he could tell whether a body was hard or soft; 22d, greater sensibility to contact; 23d, last trace of disagreeable feeling had disappeared. The massage consisted of stroking, kneading, and percussing for five minutes every day. Türk is said to have been the first to prove that slight degrees of anæsthesia may be got rid of by rubbing alone. Instinct preceded him.

Before cutting down and laying bare a nerve-trunk, to stretch it for relief of the pain of locomotor ataxia or for any purpose whatsoever, massage should be thoroughly tried, as the action of each method is somewhat similar to the other, releasing the nerve from the neighboring tissues that compress it, and producing changes in its structure and circulation, and lessening its irritability, perhaps by over-inciting it. Massage makes repeated mild stretching and might succeed when more violent stretching would fail. Langenbuch makes use of massage in the vicinity of the wound after the violent stretching by surgical operations. It is not stated whether he or anyone else had tried massage before resorting to such extreme measures. He has operated in one hundred cases of locomotor ataxia, but gives no summary of results. He speaks of six cases out of sixteen as being cured of their pain and disagreeable feelings. The indications for the surgical operation of nerve-stretching are not clear, and evidently it must be done for luck, for Langenbuch says: "I have operated in far advanced cases which to all appearances were very unfavorable, when the patient had not left the bed for two or three years, and have seen the patient get on his feet again; also I have been able to accomplish very little in

relatively early cases which had neither much pain nor any symptoms of bladder disturbance.* Hence the uncertainty of prognosis. Bardeleben, in a *résumé* of the results obtained in his experience, disclaims responsibility for the operation. He only operated when requested to do so. He had obtained no good results, and it was generally without benefit to the patient. "We can never know whether the nuclei of the affected nerves are destroyed or remain so as to favor restoration to the fibres." Dr. G. L. Walton reports four cases of nerve-stretching for affections of the spinal cord with no beneficial result (Boston *Medical and Surgical Journal*). Dr. Mortimer Granville has succeeded in relieving the pains of locomotor ataxia and other affections by means of percussion over the affected nerves, and he thinks this endeavor to bring about a natural condition ought to be tried before resorting to so formidable an operation as firmly stretching a nerve, and for the time being mechanically disorganizing it.

There seems to be no doubt as to the benefit that locomotor ataxic patients derive from suspension by the head and axillæ; but how this acts is still largely a matter of conjecture. That the spinal cord receives any stretching at all in this way is very doubtful, though the spinal nerve-roots may receive some. The vertebral column is elongated from two and one-half to four centimetres (one inch to 1.6 inches); its muscles and ligaments are stretched. But this is accompanied with great danger in some cases. The same result can be attained much more safely and effectually by making extension and counter-extension at both the head and feet simultaneously, with the patient in a horizontal position or even on an inclined plane. Suspension from the elbows by the sides can act only upon the muscles of the trunk and chest, and in the same proportion take it off the spinal column, if suspension by the head be used at the same time. A better and more efficacious way than any of these is by passive or active flexion and extension of the trunk, preceded and followed by massage. For accomplishing this any physician may have his method called after his name, according to the skill and ingenuity he may display. The experiments of

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* Berliner klinische Wochenschrift, March 20 and 27, also Dr. S. G. Webber's Report in Boston Medical and Surgical Journal, 1882.
Virchow and Hirsch's Jahresbericht, 1881.

Hegar * throw much light on this subject and are regarded as the most satisfactory. He laid bare the dura mater of the spinal cord in the dorsal region and inserted into it two bright threads, at a distance of 12.5 centimetres from each other, the cadaver being in a horizontal position, back uppermost. Moderate flexion, produced by placing blocks under the chest and abdomen and bending the neck, the legs being free, made the distance between the threads thirteen centimetres, an increase of five millimetres. Strong flexion in the same manner made the distance 13.2 centimetres, a gain of seven millimetres in all. This was increased only one millimetre more by flexing the thighs upon the abdomen, with the knees extended. The cadaver was then placed flat, as at first, and the distance between the threads became 12.5 centimetres as before.

Both sciatic nerves were then laid bare and a strong pull made upon them, which only increased the distance between the threads one millimetre. The spinal column was again flexed and the distance measured 13.1 centimetres, an increase of six millimetres; and in this position the sciatic nerves were strongly pulled, and the distance became 13.3 centimetres, a gain of eight millimetres in all.

The next question to determine was whether the spinal cord itself partook in the extension. The dura mater was opened, and two threads stitched into the substance of the cord at a distance of 15.35 centimetres from each other. Upon moderate flexion this became 16.1, and upon strong flexion 16.4 centimetres. Hence we arrive at the very interesting conclusion that the cord itself allows greater extension than does its dura mater. Division of both sciatic nerves had no influence upon the result.

By means of forcible bloodless stretching of the nerve-trunks Cattani obtained the same results as by bloody stretching,—tearing of the axis-cylinder, stretching of the medullary sheath, with subsequent degeneration and regeneration.

We have every reason to suppose that stretching and relaxing of nerve-filaments, nerve-trunks, and even the spinal cord itself are as essential for their proper circulation and nourishment as muscular contraction and relaxation are for the nutrition and welfare of the muscles. But, of course, even this feature might be carried to excess.

Dr. Lauder Brunton is of the opinion that the remarkable

* Wiener medicinische Blätter, 1884, No. 3.

benefit obtained from suspension in cases of locomotor ataxia is difficult to explain, but is inclined to think that it acts upon the cord in the same way that massage does upon the muscles,—by removing the lymph and with it the products of waste, while at the same time it increases the processes of oxidation and repair by promoting a free circulation of the blood.

The writer has frequently been asked by thoughtful physicians, "Have you ever cured a case of locomotor ataxia by massage?" as if they really thought it might be possible to do so. Patients with this disease are generally more hopeful of beneficial results than physicians, and the knowledge, for which we have such good authority as Erb and Ziemssen, that this affection frequently comes to a stand-still and improves, and that in some few instances recovery has taken place, ought to inspire us with more hope and zeal to coöperate with the sufferers. Dr. Mortimer Granville says: "In neurasthenia and even commencing sclerosis of the spinal cord with loss of tendon reflex the most remarkable effects are produced by applying the *percuteur* (percussion instrument) over the spinous processes of the appropriate vertebræ. In a few cases I have failed, but in others—not a few—the locomotor ataxia has been removed or sensibly ameliorated and the general improvement was astonishing." ("Nerve Vibration and Excitation," p. 41.)

Progressive Muscular Atrophy.—From a summary of the most recent and comprehensive views gleaned from the experience of the ablest and most trustworthy observers of *progressive muscular atrophy* by Eulenberg we learn that the prognosis of this affection is generally unfavorable, but by no means absolutely hopeless, for the treatment of it has many successes to boast of; but in order to gain these "*it is necessary to begin as early as possible and to persevere with untiring patience as long as possible;*" that "*absolutely nothing is to be expected of internal remedies;*" and that "*the only suitable and really trustworthy remedies are electricity and medical gymnastics.*" Undoubted successes, he says, have followed the use of suitably localized gymnastics in this disease, and it is easy to say that we possess in active and passive movements an agent of especial efficacy for the interstitial changes within the muscles. In a case that had recently fallen under his observation the process of massage was said to have brought the disease to a stand-still.

The following is a case of this kind in which I have used massage. Mrs. E. R. was an elderly lady and enjoyed a remarkable degree of health, notwithstanding the fact that she had labored under *diabetes mellitus* of several years' duration, which was kept under by restricted diet and frequent sojourns at Carlsbad. For six months before I was called to her in January, 1878, she had difficulty in tying a knot, inserting a pin, turning a key, and also in writing, all of which appeared soon after excessive use of the hand in cutting out with scissors garments for the poor. These symptoms of weakened muscles and lack of control slowly increased in an ascending manner, and group after group continued to become atrophied and powerless. They had progressed to a considerable extent in one arm before the other became similarly affected; later, body and legs were also affected, and for a while speech was greatly impaired before deglutition and respiration shared in the malady. Finally the patient died, four years and a half after the appearance of the first symptoms. Massage with such movements as the patient was able to make were kept up for two years; resistive movements and exercise with elastic tubes so long as the patient could do them; then, when she could not oppose anything, simple active motion, and, when this failed, assistive movements; and, after no effort could be made, passive motion. There was no indication for friction in this case, but deep manipulation and percussion were freely used. After the first five applications of manipulation and movements it really seemed as if the patient were cured, as she could do with ease what before was difficult, and this improvement was held for a long time, even though the treatment was interrupted by an attack of bronchitis. If Eulenberg or anybody else had seen this patient before and after these five visits, he would certainly have believed with the patient that the disease had been brought to more than a stand-still. Later, as the strength was fading out of the muscles, there was a marked improvement after each massage, so evident that, when there was no longer power to flex the arm before the massage, she could do this afterwards, and the deltoid showed the same behavior in raising the arm as the last flicker of strength was dying out. There is no doubt but massage retarded the progress of the disease in this case. I frequently warned this patient of the gravity of her symptoms, and told her that she ought to consult other physicians; but this only made her all the more deter-

mined to adhere to me and to massage, the effects of which were so apparent to her. In one case of suspected incipient progressive muscular atrophy that came under my care the symptoms disappeared entirely under massage and have not yet returned, now seven years.

Dr. S. Weir Mitchell says: "It is many years since I first saw massage used by a charlatan in a case of progressive paralysis. The temporary results he obtained were so remarkable that I began soon after to learn what I could of its employment." ("Fat and Blood," p. 51.)

Theory and practice do not quite harmonize in the treatment of locomotor ataxia as compared with that of progressive muscular atrophy. In the former, rest has been advocated; in the latter, exercise and massage. It seems hardly reasonable to urge on by exercise the degenerating cells of the anterior cornua in progressive muscular atrophy; while one would think that in locomotor ataxia the disease in the posterior columns and vicinity would be favorably acted upon by the derivative influence of increased activity of the anterior portions of the cord called forth by such means as exercise, massage, passive and resistive movements. On the other hand, if the degenerating nerve-cells in the anterior cornua are benefited by functional activity, and the evidence is that they are, ought we not to expect that cultivation of the coördinative powers would exercise a like favorable influence upon the coördinating tracts presumed to lie within the posterior columns? * We are told by Mortimer Granville that in the case of the blind who become ataxic the muscular sense, being so highly developed, compensates for the loss of sight, and that it is not easily impaired even by paralytic disease, and therefore the distinctive symptom of ataxia is often wanting until an advanced stage of the disease. Could we have a greater argument than this in favor of massage and the cultivation of movements which improve faulty muscular sense? In one of my cases I have used walking with the eyes shut, and I believe it has improved coördination.

Massage in Pseudo-Muscular Hypertrophy.—In *pseudo-hypertrophy of the muscles,* which is considered a modified form of progressive muscular atrophy, inasmuch as the first stage of it

* I made this suggestion in the first edition of this book in 1884 long before Fränkel was credited with putting it to such miraculous use.

consists of a chronic irritative process of the interstitial connective tissue affecting secondarily the muscular elements, and hence defined by Friedreich as *a chronic myositis accompanied by interstitial hyperplasia of the connective tissue,* massage and hydro-therapeutics seem to have been of value in some cases. As regards the use of these with localized gymnastics, there are as yet too few observations, but they seem to promise advantage in the initial stage of the disease, though at a later period no success is to be expected, at least in the restoration of the affected muscles (Eulenberg).

Disseminated Sclerosis.—In a case of *disseminated sclerosis* of the spinal cord that lingered along for many years under the care of the late Dr. Edward H. Clarke, it was thought that the patient declined more rapidly in the summer months, when he did not have massage, than during the rest of the year, when he did. During the eighteen months that he was under my observation massage seemed to preserve the nutrition and power of contraction of the muscles and to lessen the tendency to undue increase of adipose tissue to a very late period of his illness. The patient experienced so much benefit from manipulation that he asked to have it on Sunday as well as every week-day. His pulse before massage was from 90 to 96; after, 84 to 90. Respirations before massage, 24 to 28 per minute; after, 13 to 24. Dr. Brown-Séquard, who saw him late in his illness, stated that he was no worse than he was one year before. Of course, skilful medication had much to do with sustaining the patient. He could lift four hundred and sixty pounds on a lifting-machine, and took this as one of his daily exercises until his disease was far advanced, and at a time when his walking was like that of a drunken man. It is not likely that this would have been allowed had not experience proved the usefulness of it.

Massage in Chorea.—Encouraging success has attended the use of massage and gymnastics in *chorea* without much regard to the pathology or causation of the affection. It is generally agreed that the seat of this malady is for the most part in the brain, though the spinal cord and peripheral nerves may, and generally do, share in the disorder, which is of such a nature as to weaken the force of the nervous system without destroying it. Rest, massage, and abundance of easily digested food have proved successful in the early or acute stage; in the decline of the malady, when slight irreg-

ular movements have still lingered, massage, exercise, and calisthenics have done well. Anæmia, chlorosis, rheumatism, endocarditis, etc., should be met by appropriate remedies. But "there are great difficulties in the way of forming a critical judgment of the activity of remedies in this disease, whose duration is so variable, whose course is always subject to spontaneous remissions, and which so often passes away quickly and easily without any medication" (Von Ziemssen). Nevertheless, the medical treatment of chorea is pronounced very satisfactory, and complete cure is the rule in from two to three months on an average. Massage does better than this, if we may believe the published reports, and they are properly vouched for. In 1847 the staff of the *Hôpital des Enfants* in Paris appointed Napoleon Laisué to use massage and movements in the treatment of chorea, and the results were reported to the Academy of Medicine by M. Blache, one of the physicians to the hospital. From this report we quote the following: "One hundred and eight (108) cases have been submitted to the treatment by massage. Of these, one hundred were in the first attack, at the beginning of the affection and severely afflicted; eight were on the decline. These were divided again into two categories: thirty-four cases of medium intensity; seventy-four in which the agitation was as violent as could be. The thirty-four cases of the first class were all cured on an average of twenty-eight days with eighteen *séances*. Of the seventy-four more serious cases sixty-eight cases were cured in fifty-five days with thirty-one massages. There remained six cases without success, chronic cases, which finally got well in one hundred and twenty-two days with seventy-three *séances*.

"Let us speak of the details. Take a patient lying in a bed in the form of a box with upholstered sides to protect the child from injuring itself by its violent and disorderly movements, the child unable to stand or hold anything in its hands, not even able to speak,—in a word, with powerless will. While three or four assistants hold the little patient on its back and keep it so for ten or fifteen minutes, the 'professor' *massées* with his whole hands the upper and lower extremities and the front of the chest. The posterior aspect of the patient is similarly dealt with, but principally the muscles of the back. A *séance* of this sort lasts about an hour and is repeated once in three or four days. Each time an amend-

ment is observed in the disorder, and if the patient is wakeful, as is usually the case, calm sleep follows.*

"Conclusions: 1. None of the methods of treatment applied to St. Vitus's dance has given so many cures as massage either alone or with sulphur baths.

"2. Massage can be employed in almost all cases without being interrupted by the contra-indications which present themselves to other methods of treatment.

"3. Cure is more durable than that obtained by sulphur baths, and the sedation shows itself in the first days.

"4. As the disorder declines, the constitution is ameliorated in a marked manner, and patients are cured not only of the chorea, but also of the anæmia which so often accompanies it.

"The exercises are in no manner dangerous. They are of two kinds: passive, when the will has no power over the muscles; active, when they can be done." From the way the report reads one would infer that no medication was used, but M. Blache says that analeptics ought to be employed with the massage. Besides Blache, five other physicians testify to the value of massage in chorea as used by Laisué. Less massage at one time and oftener repeated would have been better.

The London *Lancet* for August 5, 1882, contains an article by Drs. Goodhart and Phillips on the treatment of acute chorea by massage and the free administration of nourishment, with rest in bed. These authors state that no treatment is so satisfactory but that others may prove useful in selected cases. They are evidently not aware of the fact that massage had been used in chorea before they tried it; at any rate, if they had been, they would doubtless have corroborated their results by quoting those of Laisué. They consider the disorder a nervous habit aggravated by neglect and nerve-exhaustion into an acute disease. Three cases of heart disease with fever which speedily proved fatal were not regarded as suitable for this treatment, and it was not tried at all with them. Twelve cases were treated in the manner spoken of, and the advantages proved to be: that when the massage was carefully performed, flabby and poor muscles became plump and healthy; the various groups being manipulated in an orderly manner, it is inferred that

* Moniteur des Hôpitaux, 1er Août, 1854. Laisué du Massage, p. 27.

some influence was exerted towards restoring more equable nerve-discharges from the centres which control them and dispelling a disorderly habit by an orderly one; the supplies were utilized to their utmost and without call upon the diminished capital of brain power. These observers modestly state that the success was not in all cases convincing. If anyone will take the trouble to read the details of their cases, they will find no reason why they should thus have underestimated their success. Marked improvement was observed in every case in the following particulars: a decided increase in weight; rapid subsidence of all the more violent movements; the extremities soon became warm; the pulse fell and became more regular; the patients slept soundly after massage.

The temperature, which is usually normal in chorea, was found to fall from 1° to 2° F. after massage. The amount of urea excreted was tested daily, but no increase or decrease could be found to correspond with the increased nitrogenous waste. Systolic murmurs and bruits disappeared. Massage was given for fifteen minutes twice daily, much more sensible than the hour doses employed by Laisué. Why the treatment is only advocated for the acute stage of chorea and not for the chronic does not seem clear, unless it be that seeing such marked benefit from it early led them to expect too much from massage later, when there was less margin for improvement. The last remnants of any affection are generally the hardest to get rid of. If calisthenics had been added to massage, the minor disordered movements that remained and characterized a few of their cases as chronic would have disappeared more quickly. Only in one case was medicine given, opium and bismuth on account of diarrhœa, while massage was *suspended* for three days. In four of the cases the treatment produced a striking result, and it was believed to be instrumental in saving the children's lives. All the cases were of the most unfavorable kind, with, in some, bad family histories as predisposing causes; most of them could not stand, others could not articulate and suffered from night-terrors, with loss of control over their dejections and inability to feed themselves. The relief from these distressing symptoms was too marked to be regarded as mere coincidence. The treatment produced good effects in all, and in several upon the chronic movements also. It is difficult to refrain from giving all the details of the cases, as they

are so full of interest and import. In the first case, all active movements ceased after seventeen days of massage; in the second, after eight days; in the third, after twenty-one days; in the fourth, after seven days; in the fifth, after fourteen days; in the sixth, after twelve days; in the seventh, after fourteen days, and night-terrors disappeared, weight increased, and the patient took food well. This case was called a decided failure. What then must have been their successes? In the eighth case, four years of age, after seven days the patient could feed himself, articulate distinctly, pass dejections consciously, and a "postsystolic brush" had disappeared. In case nine the patient could not stand on admission, but after fourteen days was allowed to get up, and there was no return of the movements. In case ten after fourteen days of massage all headache disappeared, movements ceased, and grasping power returned. These were treated at Evelina Hospital. Cases eleven and twelve were treated at Guy's Hospital with similar results.

After these two encouraging reports of the value of massage in chorea my own experience is scarcely worth mentioning. Nevertheless, the following case presents some points of interest not brought out in the above one hundred and twenty cases. It occurred at the City Hospital in the service of my friend, Dr. John G. Blake. Mary Wise, nine years of age, was admitted January 16, 1874. But little could be learned of her history. She had had rheumatism three weeks before, but for several days there had been no pain. The appetite was good and bowels regular, but the child was anæmic. There was insufficiency of the mitral orifice, as shown by a loud murmur at the apex with the impulse. There were spasmodic movements of the limbs, and the child could not feed herself nor use her left hand. Bromide of potassium in twenty-grain doses with two grains of iodide of potassium were given three times daily, and also six drops of the tincture of the chloride of iron. Four days later there was more control over the limbs and the patient could feed herself. Twenty-seven days after admission the irregular movements were still violent, especially of the face, left arm, and left leg. It was then that massage was begun and medicine and electricity omitted. I gave her twenty to thirty minutes' massage every evening, and she slept soundly after this, better than after bromide. She could not at first do anything like calisthenics or gymnastics, but I directed, whenever the irregular movements

occurred and also between their attacks, that she should seize the foot of her bedstead and pull with all her might; in this way the will soon regained control over the muscles and broke up the disorderly attacks. After one week she could walk from one end of the ward to the other, about one hundred and twenty feet, on a straight line formed by the seam of two adjoining pieces of flooring, and at the end of two weeks she was assisting the nurses in carrying liquid medicines. In this case massage more than took the place of the medicines which had done so well, but the effects of which seemed to have come to a stand-still.

In the sixth century chorea was cured by dancing for three hours, after which the subjects of it were free for a whole year (Schenk de Graffenberg). Horst, a physician of the seventeenth century, says that persons affected with involuntary movements danced during the day and night till they fell on the ground in a trance. Afterwards they were quiet till the next year, when they again felt an agitation and they returned to the chapel at Drefelshausen near Ulm in order to dance (Roth).

Risks of Massage in Diseases of the Nervous System.—In affections of the nervous system massage may be overdone, badly done, or misapplied. These distinctions could not have been very clear to Dr. Althaus when he called the attention of the profession to the "Risks of Massage" in the *British Medical Journal* of June 23, 1883. Evidently he regards all sorts of massage alike, without reference to quality or quantity. He says that massage, long the Cinderella of therapeutics, has now become as thoroughly fashionable as homœopathy and mesmerism have been. However applicable to obstinate hysteria, he deprecates the indiscriminate use of massage to all sorts of cases of cerebral and spinal diseases in which loss of motion is a conspicuous symptom. He mentions a few pages at the end of a book on orthopædic surgery by Professor Busch, of Berlin, as the most recent and sensible treatise on massage, wherein it is recommended in writer's palsy, stammering, hysteria, and muscular paralysis, or paresis after poliomyelitis, without, however, saying much in its favor in the latter condition.* The doctor proceeds in these words: "It appears to me that dis-

* In the British Medical Journal for May 31, 1879, Dr. Althaus himself speaks approvingly of the use of percussion in infantile paralysis.

eases of the brain and spinal cord must, on account of the anatomical situation of these organs, be inaccessible to the influence of massage, which can only be applicable to more superficial parts of the body. Many of the most important diseases of these organs are of an inflammatory or irritant character, either primarily or secondarily, and massage should not be used for their treatment even if the suffering parts could be reached by it. I will here only allude to many forms of cerebral paralysis from hemorrhage, embolism, or thrombosis, which are followed by sclerosing myelitis of the pyramidal strands and most forms of primary lateral, posterior, or insular sclerosis of the spinal cord." . . . "In most cases of lateral and insular sclerosis, which are now unfortunately much treated by massage and exercise, rest is indicated rather than active exercise, and overstraining of the enfeebled muscles acts prejudicially on the state of the nervous centres. I have recently seen quite a number of instances in which the central disease had been made palpably worse by procedures of this kind; and in a case of cerebral paralysis which was some time ago under my care the patient had, after four such sittings, been seized with collapse, which nearly carried him off."

To this Professor Playfair replied in the *British Medical Journal,* June 30, 1883. Having been one of the first in England to call attention to the value of massage, he held himself in a manner responsible for its having become as fashionable as mesmerism and homœopathy have been, if such be the fact, of which he has no knowledge. If Dr. Althaus compares these systems with massage, the comparison is most unjust, says Professor Playfair. "Mesmerism and homœopathy," he continues, "are what we all know them to be; massage is a thoroughly scientific remedy based on good physiology and sound common sense, the value of which, in properly selected cases, no one who has any knowledge of the matter can possibly question; and which doubtless, when improperly applied, is capable of doing much injury, as any other powerful treatment may under similar circumstances." He is quite in accord with Dr. Althaus as to the importance of accurate diagnosis before resorting to its use. But if he should adopt the same method of argument as Dr. Althaus, he might, he says, illustrate the difficulty of accurate diagnosis in doubtful cases of neurasthenia by several very remarkable instances in which patients have been for years

treated as subjects of organic spinal disease by some of the most eminent neurologists, in which the error of diagnosis has been conclusively proved by their rapid and complete recovery under appropriate treatment, of which massage formed an important part. He concludes by saying that the results in well-selected cases are so remarkable that it is not surprising it should run the risk of being at times injudiciously used, as Dr. Althaus supposes to have been the case. This only happens when a new subject attracts attention.

Though these two giants have crossed swords on the subject of massage, the assailant has been spared in his weak and vulnerable points. It will be seen that Dr. Althaus at one and the same time denies and admits the influence of massage upon the nervous system. On account of the situation of the brain and spinal cord, he denies that massage can have any influence upon their diseases. This may sometimes be true, but not on account of the situation of these organs, but by reason of the nature of their diseases. He evidently forgets that all external impressions, whether of heat or cold, of massage or electricity, of a chemical or mechanical nature, do and must affect the brain and spinal cord, otherwise they could not be perceived. He admits that massage, or more likely some violent handling that has passed for massage, by overstraining weak muscles, acts prejudicially on the affected nerve-centres. But massage can be applied so as not to be overstraining, irritating, or collapsing in its effects, though collapse may occur at any time in some of the conditions mentioned by Althaus, and especially in such a case as he says it did. How many of such cases have collapsed or died while receiving electricity? Certainly some have. Is electricity to be blamed for this if properly administered? Assuredly not, any more than if the physician himself had died of apoplexy while administering it. Laisué was careful to have the physicians of the *Hôpital des Enfants* sign a statement that no untoward event had occurred in his massage and exercises of one hundred and eight cases of chorea. If this remedy is so dangerous as Dr. Althaus makes out, here certainly was a chance, at least a coincidence, for harm to follow in these cases which "are so apt to terminate in paralysis," according to Broadbent.* The fact that none of them

* One of those best acquainted with chorea.—Von Ziemssen.

did terminate in paralysis would be a strong argument for massage as a preventive measure against such a catastrophe. In a case of a different kind I am sure this calamity was averted for a while by means of massage. The patient was a gentleman sixty-nine years of age, who had enjoyed a life of health and activity, but who for many months prior to my visiting him had been deprived of rest and sleep by extensive business cares and sickness in his family. During the day his mind was at times confused and slight things annoyed him overmuch. In the evening his face was deeply flushed and he suffered from headache. Apoplexy was feared, as several members of his family had died in this way. The promptness with which sleep returned, headache and flushed countenance disappeared, and clearness of mind with vigor of action were enjoyed on the commencement and continuance of massage left no room to doubt its benefit, for his family and business cares were still upon him during his treatment, and no other was employed. The excess of blood going to his brain was directed to external organs by massage, and the patient was thus bled into his own peripheral circulation. He continued well till the day of his death, which resulted from cerebral hemorrhage, seven months afterwards.

After being repeatedly desired by two old hemiplegics to give them more than thirty to forty minutes of massage I finally yielded, with the result of fatiguing them unduly for several days. In two cases of chronic myelitis I used massage for several weeks without either benefit or harm resulting. In a case which was diagnosticated by an ophthalmologist and a neurologist as one of tumor of the brain, the first massage of the head relieved the pain, which was at its worst, and put the patient to sleep for several hours in the absence of his usual large dose of morphia. The sleep was longer and more refreshing than that which was obtained from morphia, and so deep that the patient did not know when I left the room, though I spoke to him in an ordinary tone. Subsequent massage and everything else had less effect, and the patient died. In another case diagnosticated as chronic meningitis at the base of the brain, the severe pains that radiated from the occiput to the temporal region in the early stage of the illness were repeatedly relieved by massage, so much so that it was thought probable recovery would follow,—a hope that was vain.

In hyperæmia of the brain and its membranes, whether owing to an increased flow of blood to this region or a hinderance to the return of a normal quantity, stroking the neck so as to hasten the current towards the heart in the jugulars has a rapidly depletory influence similar to copious blood-letting or compression of the carotids, but without the possibly injurious effects of these. The pressure of blood in the cranium can thus be quickly lowered, and it has proved an excellent preparatory measure for the use of other depletory agents, such as cathartics, etc.

Gerst, military surgeon at Würzburg, has obtained notable advantages from the use of massage in two cases of serious injury of the head. In one of these there was concussion of the brain with contusion of the soft parts of the cranium, hemorrhage externally and in all probability internally. The other suffered from a fissure of the cranium with a contusion of the left half of the chest and effusion of blood into the pleural cavity. The wounds were treated antiseptically. Stroking (*effleurage*) of the neck, so as to rapidly empty the jugular veins, was employed in both cases, and "this exercised a salutary action in preventing the evils of hyperæmia and in favoring the absorption of the exudation. Thanks to this influence, we have seen the symptoms of compression of the brain produced by the intracranial hæmatoma, as well as that at the seat of the extracranial hemorrhage, ameliorated rapidly. There was, in one of the cases, paresis of the iris of the left eye with deviation of the tongue to the left and paralysis of the bladder and of the rectum. These all disappeared quickly, and there were no symptoms of inflammatory reaction on the part of the brain. It is certain that the effleurage has been useful in these two cases, for at each application the patients experienced marked relief in the head. Their pains diminished and the paralytic phenomena disappeared.* Gerst adds that for a long time he has thought that advantage might be derived from massage in paralysis of cerebral origin. He used it for a few minutes at a time, and several times daily. Relief followed from this, which was not apparent from the use of ice-bags on the head. Branting and Georgii hoped by this means to maintain the nutrition of the muscles and to prevent the consecutive atrophies and contractures.

* Schmidt's Jahrbücher, 1879, No. 10, p. 73.

Professor Erb tells us * that external frictions are much used and highly esteemed amongst the non-medical public in Germany, but are usually rejected by physicians; and in this respect, he says, medical scepticism often goes too far. Of the efficacy of external friction in diseases of the spinal cord and its envelopes he believes he has *quite accidentally* proved to himself the benefits of such procedures, and he is therefore unwilling to see them quite abandoned. "Friction with spirituous substances upon the skin," he says, "may excite and enliven the action of the spinal cord and bring to pass a better functional condition and nutrition in it. The soothing effect upon the peripheral cutaneous nerves produced by inunction with warm oil or narcotic salves has a soothing action upon the central nervous system, and this contributes to the removal of diseased conditions. Moreover, they sustain the courage of the patient." It is evident that Professor Erb has not yet accidentally proved to himself the tonic and sedative action of massage without the aid of spirituous liquors, oil, or narcotic salves; and when he does, it may puzzle him to decide when to use massage and when to use galvanism.

My friend, Dr. David F. Lincoln, wrote to me inquiring: "Do you consider massage safe in cases of vascular degeneration of the cerebral arteries? Do you see any contra-indication for it in cases of senile degeneration of the brain accompanied by slight paralytic shocks (thrombosis)?" To these questions my reply was, "Massage contra-indicated." Soon after this I met the doctor, and he told me that the patient to whom his questions referred had died since he wrote to me. If massage had been used in this case it would probably have been credited with some of these shocks, and perhaps with killing the patient, according to Dr. Althaus.

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* Ziemssen's Cyc., Vol. XIII., p. 187.

XIV.

Massage in Raynaud's Disease (Symmetrical Gangrene).

"And Asa in the thirty and ninth year of his reign was diseased in his feet, until his disease was exceeding *great:* yet in his disease he sought not to the Lord, but to the physicians.

"And Asa slept with his fathers, and died in the one and fortieth year of his reign."—*II. Chronicles* xvi., 12, 13.

It is quite evident that the disease with which Asa was afflicted was in both feet for a long time—at least two years. Therefore it is not at all unlikely that it may have been dry, symmetrical gangrene, as will appear more clearly after reading the following pages.

Early in March, 1899, I perused an interesting "Report on Massage at the Surgical Clinic of the University of Berlin," by Professor Zabludowski.* I confess, however, that my faith was severely taxed when I read that in a case of weakness of the heart following influenza one leg which had not been *masséed* became gangrenous and had to be amputated, and that the other leg soon after began to present similar appearances, but became normal under careful massage. While I was speculating on whether this could possibly be true an elderly lady called at my office and told me that ten months previously her husband's right leg had to be amputated on account of gangrene; that the left one seemed to be similarly affected, and that her physician, Dr. Samuel Crowell, had sent her to me to learn if massage would be of any use. (A few days before a very thoughtful patient, in no way connected with this case, remarked to me that massage ought to be good for gangrene; so this matter seemed to be in the air.)

No time was lost in getting to such an interesting patient. I found him to be an unusually intelligent man, a baker by occupation, sixty years of age, and fairly well nourished, considering that he had suffered from saccharine diabetes for fourteen years, for which he was under suitable diet and medication by Dr. Crowell, and doing well in this respect. For fifteen months the left leg

* Sammlung klinischer Vorträge, No. 209.

had presented appearances similar to those that led to amputation of the right one. I found it pale, cold, and bloodless, although it was warmly wrapped. *The pulse could not be felt in the dorsal artery of the foot nor in the posterior tibial.* There was a dark scab on the outside of the metatarsophalangeal joint of the little toe, one at the end of the great toe, and one on the inside of the ball of the great toe. The last was one inch long, half an inch wide, and seemed to extend rather deeply, though it was but three weeks old. He had had ten of these black scabs come and go within the preceding year. Some of those on the outer aspect of the foot had been comparatively large. For a long time before the appearance of any dark spots he had suffered severely from pain, numbness, and other disagreeable feelings in both feet by day and night. During the previous six months the foot had been growing steadily worse, and the question of amputation was being considered. His pulse was 120, heart-sounds normal, and he was of a cheerful disposition, notwithstanding the gloomy prospect.

After half an hour's massage, possibly less, the whole leg and foot were warmer, the tissues suppler, and tension less, and *the dorsal artery of the foot could be felt well enough to count the pulse.* To the patient the leg felt in a glow, and the pulse was 102. My delight and astonishment were almost unbounded at seeing a dead leg brought back to life in such a short time. I could hardly believe the evidence of my own senses. Directions were left to bathe the leg well in warm water and to rub it every morning with warm olive oil. Next day I learned that after my visit the previous afternoon the leg had continued to feel warm the rest of that day and all night, and I could still count the pulse in the dorsalis pedis artery before massage.

The method of working was principally by deep manipulation in a downward direction to aid the arterial current, followed and alternated by upward friction, or *effleurage,* to aid the venous and lymphatic flow. To this were added at the second and subsequent visits resistive movements of flexion and extension of the foot and leg. After these procedures at the second visit the pulse in the foot was more perceptible than before.

The patient had been confined to the house and the same floor for fourteen months, much of this time to the same room, and only allowed to go from his bed to his chair by the window on crutches,

—a few steps. I told him to walk into his front parlor on the same floor once an hour, and to have his body rolled once daily with a baker's roller by one of his own family. His general strength rapidly increased on this plan, and he was allowed gradually to returned to a mixed diet, and did well on this.* In a few days he was walking twice every half-hour to the front room and back again to his bedroom. At the end of a week it was evident that the large, dark eschar on the inside of the ball of the great toe was growing pale in the centre, and that its margins were diminishing by the encroachment of healthy skin. Five days later this improvement was still more marked, and the patient was very cheerful and hopeful. I visited him every day for a time, and thereafter every other day, getting valuable assistance from his wife, who was a most faithful nurse. He was able to go downstairs and enjoy life in five weeks from the time I first saw him.

The progress of this case, however, was not without anxiety or interruption. About four days later there came a light purplish appearance around the scab at the end of the great toe, which was temporarily lessened by the derivating effect of massage around it. Four days after this the purplish region had increased, so that it covered the whole of the top of the great toe and also the inner aspect as far as the terminal articulation. It had become darker in color, somewhat like a purple grape, and had a blistered appearance, as if it had been scalded. To the touch it did not seem warmer than the surrounding skin; to the patient it felt very uncomfortable. He had had such symptoms before, and they had been premonitory of something worse. His exercise of walking twice every hour to the front room and back was decreased to once an hour, the temperature of the water with which the leg was bathed was reduced, and massage was resumed oftener, for we had been gradually slacking up on this. In a week there was decided improvement, and he was again going down stairs once a day. The dark spots with purple margins gradually faded away and disappeared, and he was doing so well that he was left to the care of his wife. The whole period of my attendance was a little less

* Since this chapter was written I have learned from Dr. Crowell that this patient's urine always contained sugar in about the same quantity whether he was on a diabetic diet or not, and during the last five years of his life albumen also was present.

than two months. Then I no longer doubted the statement of Zabludowski,—that a leg presenting the incipient appearances of gangrene had been saved by massage and remedial movements,—a statement which without this experience would have been incredible.

A year later I called to see how this patient was getting along, and found the foot and leg looking quite natural, no dark spots nor unnatural color anywhere, and he was wearing an ordinary stocking. The pulse could be felt in the dorsal artery of the foot as well as in the posterior tibial; and after fifteen minutes of massage by way of experiment it became fuller and stronger and the veins more clearly visible. He had had the grippe the preceding winter, which left him worse than it found him; and within the previous month he had had two severe attacks of dyspnœa with great distress in the region of the heart, notwithstanding which he had still persisted in going up and down stairs. His appetite was failing; he no longer cared for his pipe, which till a short time before had been an unfailing source of comfort; he looked pale and thin, and his eyesight had become affected so that he could not read nor see at a distance, and something obscured his vision, though he could distinguish faces and large objects. It was evident that he was not long for this world. His disturbance of vision I naturally supposed must be due to diabetic, or possibly albuminuric, retinitis.* But fancy my surprise when I called a month later and learned that his vision had returned, so that he could see to read perfectly, after his visual trouble had lasted for two months. So we must regard the ocular episode as due to spasm of the central artery of the retina and its branches, similar to what occurs in other arteries in this curious affection.

Without suspecting its nature, Loring, in his "Text-Book of Ophthalmology," 1891, well describes the appearances, under the title of ischæmia of the retina, in which the arteries are reduced in size or are even thread-like, while the veins remain of normal dimensions or are fuller than usual. He was looking right at Raynaud's disease and did not know it.

* Since the above was written I have learned that he was seen at this time by an oculist, whose report confirmed my suspicions, inasmuch as he found on ophthalmoscopic examination that the arteries in both eyes were diminished in size, the veins congested and tortuous, besides other appearances that he thought were due to diabetic albuminuria. The lenses were clear.

Professor J. Collins Warren * was so fortunate on one occasion as to have ocular demonstration of this arterial spasm in a case in which temporary disturbance of vision occurred; the ophthalmoscope showed a well-marked contraction of the central artery of the retina. This symptom occurs sufficiently often in Raynaud's disease to make it clearly recognized. Hofmeister, of Carlsbad,† observed gangrene and loss of fingers in a case of diabetes.

Quite a number of years ago a patient came to me with symptoms which I did not then know how to interpret. If I had ever heard of Raynaud's disease at that time, I had certainly forgotten it. To my surprise, therefore, I find I have written my diagnosis, —*vasomotor spasm.* Later, with a greater complexity of symptoms, an excellent consultant labelled them rheumatism. This patient was about thirty years of age, and had had the grippe eight months before, which confined her to bed four days with high fever. At first she had severe pain in the forehead, then in the back, and finally it settled in the right hand and arm, where it stayed more or less continuously until she came to me. It lasted for a few hours to two weeks at a time, but the hand and arm were never quite free from it. It was worst opposite the palmar aspect of the middle phalanges, next in the same region of the first and third phalanges, and even when comparatively free from pain pressure here, as well as in the palm of the hand, caused pain which lasted for a few minutes. The pain extended up the arm to the shoulder. She was an accomplished pianist and could easily play for several hours when well, but at this time she could only play for half an hour at her best, at the end of which time she had to stop from pain and weakness, and then the tips of the fingers also hurt upon pressure. *When she put the hand into cold water it turned greenish-white and felt numb.* She had had the pain steadily for two weeks when she came to me, and the pulse was small and hard. Massage at two P.M. made the hand and arm feel comfortable at the time and all the afternoon; but she had more pain than usual next morning, which quickly disappeared of its own accord. Again at two P.M. she had massage, which was accompanied and followed by increased comfort and fuller and stronger pulse.

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* Boston Medical and Surgical Journal, January 16, 1879.

† Wiener medicinische Wochenschrift, No. 5, 1898.

Three weeks later I found my notes saying that under massage three or four times a week she has steadily improved, so that when pain returns it lasts for a shorter time than before and there is much more comfort in the intervals. At times she has the same sort of pain in the head, which is also much relieved by massage. She finds that this treatment puts the hand and arm in good condition for playing the piano. Five days later she played the piano for two and a half hours without fatigue or discomfort. But the progress of the case from this time was not so uniformly favorable as it had been; for twelve days later, coincident with the disappearance of the symptoms from the upper extremity, there came pain, stiffness, and swelling of the right knee.* Under massage and sodium salicylate these symptoms left the knee in about ten days, and the hand and arm resumed their former condition of pain, weakness, and numbness, turning greenish-white when exposed to cold or put into cold water, for which the massage proved as efficient and agreeable a remedy as before.

The subsequent history of this case is long and wearisome. Suffice it to say that she had numerous and varying neuromuscular pains, sometimes affecting the whole right side in a very severe manner, and requiring large doses of analgesics for their relief; and in the intervals tonics, alteratives, and antirheumatics were used. The symptoms in the hand and arm already mentioned were persistent, but were always ameliorated by massage, sometimes with the addition of the faradic current. It was five months and a half from the time I first saw her before she could be considered at all well. Evidently this case did not go beyond the first stage of Raynaud's disease,—spasm of the arteries. The other cardinal symptoms, local asphyxia and gangrene, were not present. Possibly the massage prevented their development.

There may be some doubt as to Raynaud's disease manifesting itself in a unilateral form. Dr. Solis-Cohen says he has seen one case, and others are on record.† Dr. E. W. Clarke, in the *Quarterly Medical Journal,* of Sheffield, for July, 1897, has reported a case of Raynaud's disease in which the local stasis suddenly devel-

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* Osler, in Pepper's Text-Book of Theory and Practice, refers to a case of Raynaud's disease that behaved in a similar manner to this.

† International Clinics, Vol. III., 1895.

oped, having been preceded and accompanied by severe neuralgic pains. The fingers were first affected; then the corresponding digits of the lower extremities, together with the tip of the nose and the lobes of the ear. This case did not go on to the third stage, that of gangrene, though retrogression of the malady was attended by exfoliation of the superficial layers of the skin of the affected parts. The result was complete and permanent cure; the treatment was massage and the faradic current (both locally and generally). At times the pain had been so great that morphine had to be used.

On theoretical grounds we would suppose that the galvanic current would give better results than the faradic. Galvanization of the spinal cord is said to modify favorably the arterial spasm, and this was the method Raynaud himself employed.

Dr. P. Kovacs, of Berlin, has narrated a case of Raynaud's disease in the person of a young woman twenty-one years of age, a dish-washer by occupation, who was hysterical. She presented the three main symptoms of this malady—local syncope, local asphyxia, and gangrene of her fingers—for four months. When she put her hands into cold water they turned white, later becoming blue; when she put them into hot water they turned red, and later became blue. The treatment was massage and electricity, with the wearing of gloves for warmth, and tonics internally. Almost immediate good results were obtained, and in three weeks' time both hands resumed their natural appearance, and she was advised to engage in some other occupation.*

I fear that there are very few physicians who know who Raynaud was when he first described this interesting affection now called by his name; and until quite recently I myself was amongst the majority. Maurice Raynaud was a medical student in Paris when he wrote his graduating thesis, in 1862, on this peculiar malady,—dry, symmetrical gangrene. Since then numerous articles of more or less value have been contributed which only serve to confirm the clinical picture and its variations as he first described them. His theory is that this disease is a neurosis characterized by great exaggeration of the excitomotor energy of the parts of the spinal cord that control vasomotor innervation,—the posterior and

* International Clinics, Vol. II., 1899.

lateral gray substance, according to Oppenheim. The disease in its acute form presents three marked phases,—local syncope, local asphyxia or stagnation, and gangrene. In its chronic form there is a repetition of these. It usually attacks symmetrical parts of the human body,—the fingers and toes, sometimes the nose and ears, less frequently the buttocks and other places. The local syncope, the pallor, the coldness, are explained by spasm of the arterioles. But it is not so easy to dismiss the asphyxia by saying that it is the result of complete vasomotor paralysis. The stagnation may be due to a venous cramp, for the veins, like the arteries, are possessed of a muscular coat which is not only regulated in tone from the vasomotor centre, but can also be increased by reflex irritation from the periphery.* The studies of Dr. Charles G. Cumston † led him to believe that it is not necessary for the calibre of the veins to be completely obstructed in order to produce gangrene when the nutrition and vitality of the tissues have been previously lowered by constriction of the arteries.

In explanation of these phenomena, the theory that neurons act by contiguity and not by continuity would fit admirably by assuming that in the first stage, that of syncope, the projections of the neurons that preside over vasomotor constriction have become so tightly interlocked that they cannot let go until they become completely fatigued, when they relax, lose their power of contact and simultaneously their inhibitory or restraining influence over the arterioles, thus inducing the second stage, that of asphyxia or dilatation. This theory would be consistent with the generally accepted view that dry symmetrical gangrene may arise from either central or peripheral irritation or both, the central or peripheral ganglia or neurons acting and reacting upon each other.

In support of the central origin, symptoms of Raynaud's disease have been found in affections of the brain and spinal cord. It is said to be very frequent in the stupor which sometimes succeeds acute mania or acute confusional insanity, in paretic dementia, in melancholia, and in other affections of the brain.‡ It has frequently been found in cases of locomotor ataxia and syringo-

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* Zerbes, Wiener medicinische Wochenschrift, 1898.

† Buffalo Medical Journal, 1898.

‡ Dr. James G. Kiernan, Medicine, Detroit, 1898.

myelia, and it occasionally appears along with hysteria and epilepsy.

The peripheral origin of Raynaud's disease is inferred when it is preceded by pain, numbness, and disturbed sensations. Endoarteritis and endophlebitis are considered as secondary lesions. Though the first or second stages may appear independently of each other, often the patient has no knowledge of the malady until gangrene sets in. Hochenegg found an etiological relationship between this disease and long-continued bodily straining without sufficient pause for rest; with chlorosis in young people; and with disturbances of nutrition in consequence of acute or chronic inflammatory affections and febrile infectious diseases, such as typhus, scarlatina, measles, variola, pneumonia, intermittent fever, tuberculosis, etc.* Colicky pains, intermittent hæmoglobinuria and angioneurotic œdema are frequent in Raynaud's disease, according to some observers.

Dr. Coleman found broken-down corpuscles in the blood of the affected fingers in a case of Raynaud's disease, but not in the blood of the others.† It is not yet clear how neuritis may bring on gangrene, if it ever does. Besides the *rôle* the blood-vessels play, there must be an indirect influence of the nerves upon the cells, causing a trophic disturbance.

As precursors of this interesting affection, Dr. Adolf Havas mentions that it may be announced by either general or local symptoms, such as physical alterations, depression, and feeling of anxiety; disturbances of digestion, anorexia, and vomiting; disturbances of sight and hearing, or other special sense. Locally there may be formication and furry feelings of the skin, painful pressure and feeling of stretching, hyperæsthesia, paræsthesia, and anæsthesia.‡ But as these symptoms are not only found in other maladies, but also may be entirely absent, it is evident that further developments must be awaited.

Life is not directly threatened by Raynaud's disease. The exit is usually caused by other complications. Perfect recovery may be obtained when gangrene has not already sacrificed any of the parts.

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* Pester med.-chirurg. Presse, 1898.

† Clinical Journal, London, April 6, 1898.

‡ Pester med.-chirurg. Presse, 1898.

Dr. George E. Brewer * has reported the case of a patient at the New York Hospital who developed symptoms of gangrene in both feet, which progressed so rapidly that both legs had to be amputated below the knees. The case was pronounced by Dr. Joseph Collins to be one of advanced Raynaud's disease. The patient's mental condition was one of partial dementia, and he was unable to give his name or age, and no history could be obtained other than that he had been out all night and frozen his hands and feet. It was supposed that the mental stupor was due to vasomotor disturbance of the brain similar to that which in the lower extremities produced gangrene.

In this connection the case of Dr. C. E. Riggs is of interest,† for it is stated that Raynaud's disease represents a neurosis which is not perfectly clear, but has its foundation in the central nervous system. The patient was sixty-four years of age, one hundred and ninety-five pounds in weight, and for two years before the doctor saw her she had suffered from attacks of numbness of her fingers of half an hour's duration at a time. She was apparently well, when going up stairs she was suddenly seized with numbness of the left hand and forearm, with loss of perception of heat and cold, and also complete paralysis of motion and sensation of the same. The hand was as white as marble. Next morning the finger-tips began to turn dark. Three days later she died. There were cardiac and renal complications. Unfortunately, the state of the pulse was not mentioned. The radial artery of the left arm was not atheromatous, and no thrombosis was discovered. Examination of the median nerve showed a simple parenchymatous degeneration; and of the spinal cord, from the fifth cervical to the sixth dorsal vertebræ, the posterior median columns showed degeneration and numerous capillary hemorrhages.

As to diagnosis, some authors regard Raynaud's disease in a wide sense, and consider as belonging thereto all affections whose essential symptom complex shows vasomotor and trophic disturbance without regard to their origin; while others limit the picture of this affection much more sharply, and recognize the above-mentioned symptoms as Raynaud's disease only when they are

* Annals of Surgery, July, 1898.

† Journal of the American Medical Association, December 10, 1898.

without doubt caused by nervous disturbance and, in the absence of other causes, especially organic disease of the heart and blood-vessels.

Some writers suppose that erythromelalgia, or red neuralgia, is but the appearance of the second stage of Raynaud's disease without the first. A little reflection might convince one that, if there be any relationship between them, they must be different members of the same family; for erythromelalgia usually occurs in women and does not show its peculiar change of color until the limb hangs down, when the arteries throb and the pain grows worse; it is aggravated by heat and eased by cold; it is asymmetrical, and never becomes gangrenous,—the opposite of what usually occurs in Raynaud's disease.

It would be quite as much to the purpose and equally wide of the mark to attempt to prove the identity of migraine and Raynaud's disease. Of two dozen articles which I have consulted on the latter, it seems to me somewhat remarkable that no one has pointed out the similarity between these two maladies, both of which present angioneurotic phenomena much alike in the first two stages,—vasomotor constriction followed by dilatation, and often affecting vision apparently in the same way. Rosenthal narrates the case of a hysterical girl in whom the migraine began with a sensation of cold in the fingers and toes of both sides. In a little while the face became pale. After the paroxysm the hands became warm and perspired freely, and the cheeks reddened.

Both Raynaud's disease and migraine are favorably influenced by massage.

Enough has been said about treatment in the preceding pages. It can be speedily summarized. When the local syncope and local asphyxia are slight and transient they require no treatment other than the avoidance of exposure to cold and excessive fatigue. Appropriate food and internal remedies, with plenty of fresh air for the anæmic and diabetic. Our very utmost endeavors should be used to improve the circulation, so that gangrene may not develop; and for this purpose Dr. Adolf Havas, in his article on this subject already referred to, says that massage and remedial movements often act in a most excellent manner, preserving the patient from future danger. Such would certainly seem to have been the result in the first case reported in this chapter.

From the foregoing a few conclusions may be justifiable:

1. That when massage is of benefit in Raynaud's disease it shows its effects very quickly.

2. These effects are improvement of the circulation, warmth, comfort, and suppleness.

3. The vitality of the tissues can not only be maintained and improved by means of massage, but even when destruction has begun it may be entirely recovered from.

4. As the beneficial effects of massage in Raynaud's disease are of a permanent character, it must, therefore, act not only upon the vasomotor nerves of the affected parts, but also upon their central connections in the brain and spinal cord.

5. As the symptoms of Raynaud's disease would seem to be capable of affecting suddenly or gradually the vessels of almost every part of the human body, the most varied disturbances might thus find an explanation, whether they be sudden attacks of insanity, loss of consciousness, or asphyxia,—hæmoglobinuria, colicky pains, or dead fingers, etc.

XV.

Massage in Writer's Cramp and Allied Affections.

WITH A REPORT OF TWO HUNDRED AND EIGHTY-FIVE CASES (TWO HUNDRED AND SEVENTY-SEVEN TREATED BY WOLFF).

. . . "He sweats, strains his young nerves, and puts himself in posture." —*Cymbeline*, Act III., Scene 3.

"A damn'd cramp piece of penmanship as ever I saw in my life. I can read your print-hand very well. But here there are such handles, shanks, and dashes that one can scarcely tell the head from the tail. . . . It's very odd I can read the outside of my letters where my own name is well enough. But when I come to open it it's all—buz. That's hard, very hard, for the inside of the letter is always the cream of the correspondence."—*She Stoops to Conquer*.

OVER-USE of muscles and nerves, especially in fine work requiring a high degree of delicate coördination of individual movements and voluntary impulses, as in writing, sewing, knitting, watchmaking, playing the piano, harp, or violin, etc., gives rise to similar disturbances. So do also, but less frequently, excessive use of muscles in heavier occupations, such as painting, telegraphing, tailoring, shoemaking, blacksmithing, milking, etc., occasion like troubles of motion and sensation. Predominance of symptoms may be of a spastic, tremulous, or paralytic form, with extreme fatigue, pain, formication, hyperæsthesia or anæsthesia, and thrills like electricity. There may be total inability to perform the accustomed movements, or if they be attempted for a few minutes, the symptoms just named appear. The spasms may be of flexors or extensors; there may be rigidity or contraction of the muscles, local or general tremor. No two cases are exactly alike, as these symptoms are variously combined and usually only called forth on attempting the work that has brought them on, while for all other purposes the hands and arms are well. As I predicted some time ago, we can now add another form of cramp to the list, namely, manipulator's cramp, as the penalty of those who try to do massage without knowing how, and the sufferer supposes that the trouble in his arms is owing to his having imparted so much "magnetism" out of them to his patients—his conceit not allowing him to think

that he is only suffering from an unnatural, constrained, and awkward manner of working.

In recent and slight cases good results, though few, have been obtained from galvanization, but the prognosis in general, from any treatment whatsoever, has hitherto been regarded as unfavorable, unless some objective points can be discovered as the source of the malady, such as neuritis, painful scar, or bad writing materials. In the New York *Medical Record* for April 28, 1877, I published the following cases and remarks. The first was taken from *Hygeia,* July, 1873, by *Schmidt's Jahrbücher* for 1875, and the next two from Virchow and Hirsch's *Jahresbericht* for 1874. In April, 1873, a large, strong, healthy man, thirty-two years of age, by occupation a secretary, consulted Professor Rossander for writer's cramp. He had the first symptoms two years before, which appeared as fatigue after an hour's writing. Later there was absolute impossibility for him to write at all; he could only hold the pen and make a few strokes, and on attempting to do more the hand was drawn up off the paper, and this became more violent and was accompanied with pain. The hand and arm were quite strong and normal in every other respect. The treatment consisted in the use of massage twice daily, energetic kneading of the muscles of the hand—of the thenar and antithenar, of the interossei and lumbricales; and with a small wooden cylinder percussion of the muscles of the thumb and little finger, and also of the forearm, especially of the pronators and flexor and extensor carpi ulnaris. At the beginning of the treatment the thenar muscles, on being beaten, contracted, but not strongly; but the abducens minimi digiti did not contract. Later, by degrees, it did. Subcutaneous injections of nitrate of strychnia, ten to twelve drops of a one-per-cent. solution, were also given daily in the ulnar side of the forearm. After one week there was marked improvement, and after four weeks of this treatment the patient was well.

Drachman's case was that of a lady sixty years of age, the Countess D., who for eight years had suffered from writer's cramp, with tonic convulsive spasms of the upper arm as well as of the forearm. She could neither write nor take hold of small objects with the right hand. On the middle of the flexor side of the forearm, in the tract of the median nerve, there was felt deeply situated a small, spindle-shaped, smooth tumor, pressure on which gave rise

to pain, and on strong pressure there was produced severe pain in the fore and middle fingers and thumb. Many different kinds of remedies had been tried in vain, and amongst these electricity, baths, and embrocations. After two months' treatment with massage, without the use of any other means, the patient could write and do all kinds of fine handiwork without fatigue. The neuroma had decreased and could scarcely be felt.

Gottlieb's case was that of a woman fifty-two years of age, who had suffered from the malady for nine years. She had been obliged to write nine hours daily for two years, at the end of which time the pen fell suddenly out of her hand. At each attempt afterwards to again hold the pen the hand trembled strongly. The forefinger of the right hand had become quite incapable of holding the pen, and the middle finger was also similarly affected, but to a smaller degree, on account of which the thumb, supported by the fourth and fifth fingers, was brought into use. There was no pain, but a feeling of formication on the dorsal surface of the two affected fingers. Upon attempting to work with the left hand the same symptoms were brought forth, but in a milder form. There was œdematous swelling of both upper extremities, also in the first and second metacarpal spaces; and extending upward between the muscular interstices of the whole arm were found here and there spots of infiltrated connective tissue, which were painful on pressure; these were more marked on the right side. There was considerable anæsthesia of the second and third fingers of the right hand. After thirty-seven massages the patient was discharged; the hands and arms were perfectly normal; only on long-continued and forced writing was there felt the least fatigue.*

It is not stated in the last two cases in what manner the massage was used, but in all probability kneading or *pétrissage* and percussion with passive motion predominated over simple upward friction.

When sufficient time for rest has been allowed, and in the absence of spasm, or spasm of the flexors alone being present, I should think it might be useful to add resistive motion so as to bring systematically into more powerful action the opposing and

* I have since had access to a more full report which states that she could, two months later, write twelve hours a day.

less-used extensors, which would tend to restore harmony of action by a counterbalancing distribution of will, nerve, and muscular effort.*

The indications for the use of massage in such or any other cases could not have been better laid down than has been done by Althaus in the following words: "A really effective treatment of scrivener's palsy must be an agent which is at the same time both tonic and sedative in its neural effects, which must have the power of restoring the circulation of the blood in the suffering parts to its proper condition, which is capable of promoting the absorption of serous effusions, and will thus cause the nutrition of the maimed ganglia to be raised to a normal standard. Such an agent we possess in the constant current;" and I would add, in massage also. When neither the constant current nor massage alone did any good, it might then be well to try both; on the principle of *shot-gun* therapeutics, perhaps it would be better to combine the two on starting. "By stirring up the nerves and muscles of a limb you may," says Reynolds, "to a certain extent act upon the other ends that are in the brain and spinal cord, and so improve by careful usage the nutrition of the brain and spinal cord." How exactly this agrees with the statement of Professor Erb!

An old gentleman, a lawyer by profession, at times suffered from lumbago, brought on by over-work, for which he sought relief by massage. While *masséeing* him for that more than once he called my attention to the thumb, fore, and middle fingers of the right hand, the fatigue of which from writing he was fond of designating writer's cramp, as it was only after several days' rest that he could resume the use of his pen. On two such occasions, immediately after prolonged writing, I manipulated his hand and arm thoroughly, and the following day he could use his pen as freely as usual.

A middle-aged gentleman of vigorous constitution, a lawyer in extensive practice, was frequently obliged to employ an amanuensis for several weeks, in order to recover by rest the ability to use his pen. For the general weariness at such times, when he could, he

* I fear that these cases and the suggestions made in this paragraph (in 1877) are rather damaging to the claims of priority made by those who have since published their experience with the use of massage and gymnastics in the cure of writer's cramp and allied affections.

had recourse to massage, and at two different times while treating him thus I gave the fingers, hand, and arm more thorough and special malaxation, with the result each time, after two sittings, of his being able the following day to resume his writing with ordinary ease.

Had these two cases not had the intelligence and the means to rest on the first note of warning, they would doubtless have become confirmed cases of writer's cramp. There are many cases of this kind in which I have been able to try massage. No objective symptoms were present, and as rest was indicated more than anything else, I did not trouble them with resisting or acto-passive motion.

Mr. B. is a gentleman of leisure in fine health and of unusual muscular vigor. His favorite pastime is music, and he is a skilful pianist, fond of playing the most difficult pieces; but for years the forefinger of the right hand has been a distressing bane to him, for without warning it will, as it were, *miss fire,* flex towards the palm without striking the key-note, and then he has to desist for the time, sometimes for several days. In one week I gave him three massages, manipulation, percussion, and acto-passive motion, but with no benefit, and I doubt if further treatment of the same kind would have been of any avail, as the finger, hand, and arm were perfect and powerful in every other respect. He had tried electricity, rest, and gymnastics.*

Over-use of any group of muscles gives rise to similar disturbances, some of which may be relieved by massage, as the following cases will help to show. H. W., aged twenty-five, enjoys good health and has strong muscles; by occupation a pianist and astronomer. For a year past, June 23, 1874, his wrists have been weak and lame, which he attributes in great part to the frequent and forced efforts required in elevating and changing the direction of his large telescope, which strains the extensors of his hands very much. He can play but fifteen or twenty minutes on his piano before his fingers and wrists give out from fatigue and ache. No visible or tangible defect could be found save a somewhat constrained, stiff-bent position of the fingers, making voluntary extension difficult and disagreeable.

* I saw him several years afterwards, and the same defect still existed, but he had got used to it.

The treatment for several months had been half a dozen layers of bandage wound around each wrist and rubbing with liniments, without any improvement resulting. These were left off when massage was begun, June 23, 1874. The first four visits were devoted solely to manipulation of the fingers, hands, and arms. I find my notes quote Mr. W. as saying that his hands and arms felt stronger after the first handling. At the fifth and subsequent massages I added percussion and resisting motion to all the natural movements of the fingers, hands, and arms, but more particularly to *extension* of the fingers and of the hands on the forearms, and this was carefully kept within the limits of the patient's strength, so that at no time should he be made painfully conscious of his disability, as this would have frustrated the object of the treatment. In thirteen days from his first visit to me he had eight massages, at the end of which time I again find my notes quote him as saying that "if anyone had told him that his wrists and hands could have been made so much stronger as they now were in so short a time, he would not have believed them." He could then elevate and move his telescope about with ease, and play on his piano for an hour at a time before fatigue came on. Massage was continued for a few weeks longer and the patient got quite well, so that he could use his upper extremities *ad libitum* for any mortal length of time. He has continued well, and for his scientific attainments he has recently been employed by the United States Government in a situation requiring a man physically perfect.

Dr. F. E. Corey, of Westborough, Massachusetts, very kindly sent me the following interesting account of a case of over-use of the muscles which move the humerus backward and upward, which he treated successfully with massage:

Mr. D. C. B., aged sixty-six, by occupation a cutter of leather for boots; has worked at this business a long time, following a pattern with his knife by just the same motion day after day. Previous to my acquaintance he has had attacks of lameness in the right shoulder which have obliged him to discontinue work for weeks at a time. The lameness for which I treated him commenced last winter by a slight pain on making the cutting motion, and it slowly increased in severity until the movement could no longer be made without a degree of pain which led to a discontinuance of his work.

March 23, 1875, he called at my office, and I found that the posterior fibres of the deltoid and the external head of the triceps were rigid and tender on pressure, and the pain of motion was referred mainly to them, though at times the teres muscles seemed to be involved. I began the massage that day, working in the direction of the fibres involved. After about an hour's manipulation my patient declared that he could move the arm better than before, and expressed the belief that this was the proper treatment for him. For about a week I applied the treatment every day, always with the assurance of progress from the patient. After this the application was made at longer intervals until April 19, when my patient could discover no traces of his lameness, being able to move the arm in every direction without pain. There has been no return of the trouble up to this date, August 11, 1875.

In two weeks from the commencement of treatment he returned to his work before he was entirely well.

But of all the vexatious cases that have come to me for massage in long experience of this treatment there have been none more trying than confirmed cases of writer's cramp and allied affections. It was not with regret on my part when they gave up a conflict the result of which was so doubtful. The history of these refractory cases in my hands has, in general, been improvement after a few massages, soon followed by relapse, abandonment of treatment, and resignation to their fate. Did I graduate the massage and exercises in quality and quantity to meet the indications of different cases? was a question that often occurred to me, and which was as difficult to answer as experts in diseases of the nervous system doubtless find in formulating the best methods of applying electricity in such cases. It was with feelings of satisfaction to me when at last a case came that was by no means indifferent to his fate, whose penmanship was his livelihood and that of his family, and whose faith had not yet been shaken by the croakings of wiseacres, and who had not been deceived by amateur rubbing dignified with the name of massage.

This case was Mr. A. J., thirty-one years of age, who was referred to me by Dr. George W. Gay on January 14 of this year. He was in good general health, and his muscles were well developed. It was two years before this that he first observed that he was not writing with his usual ease and accuracy, as if out of practice. He

is a professor of writing in a commercial college. He gradually grew worse, so that he had to use a larger penholder and grip it harder and harder. Occasionally there were days when he could write well and easy. It was just after doing some very fine writing that had to be reproduced, and which he first outlined in pencil, that his difficulty began. When he first came to me he could write a few lines well and naturally, then the hand and arm became tired, the hand jumped and trembled, he grasped the pen more firmly, and as the fingers contracted he lost his grip altogether; so that he presented three phases of writer's cramp—tremulous, spastic, and paralytic—in one or more of which it usually occurs. When well he wrote with his hand in the so-called regulation position, resting on the tips of the little and ring fingers, but gradually he had to let his hand descend so as to write while resting it on the whole of the middle phalanx of the little finger, and using the muscles of the forearm rather than those of the hand and fingers. At times the forefinger alone would jump from the penholder, and then he would hold it down with the thumb and endeavor to continue writing.

Examination of the hand revealed almost nothing—apparently slight stiffness of motion in the interossei between the metacarpal bones of the index and middle finger, but not more than is often met with in those not troubled with writer's cramp. There was, however, not full strength in extending the fingers, which would point to over-use of the flexors and the need of exercise of the extensors to counteract this.

It was not till after I had seen our patient a few times that he told me that nine years before he had sprained his back by attempting to shut a heavy trap-door in a steam-boat. He was beneath it, with his hands and arms extended over his head, when the boat gave a lurch, and he was suddenly thrown backward. For this he had constantly worn a corset which enveloped his whole trunk in order to support his back. With this he was comfortable, and did not require to lie down to rest during the day, but without it he drooped and sagged down, and soon a burning spot appeared about the middle of the dorsal region. Examination proved that there was nothing at all the matter with his back unless it were muscular weakness, due to having worn the corset too long. After two massages the patient felt as if he had a new back, and could go for

half a day without his support, and in the course of two or three weeks it was laid aside entirely. If the condition of his back had anything to do with his trouble in writing, the latter ought to have appeared much sooner. Neither do I think that imagination had anything to do with his writing, for he did not know what was the matter with him until the day he was sent to me.

To keep the patient at his work, and at the same time attempt to get him well, was the problem to be solved. For home exercises I prescribed at first active extension and separation of the fingers, and later the same against resistance by means of rubber bands and tubes, so many movements at stated times, in order to bring into greater action the less-used extensors, and also to give a change of exercise to the interossei, and thus help to restore the lost equilibrium of will, nerve, and muscle. But to prescribe writing exercises for a patient whose chirography was like copper-plate did not seem so easy a matter. However, I had no difficulty, for it was evident that he was painfully slow and particular, and when fatigue came on after a few lines he had hitches in rounding the backs or left lower curves of his l's and e's, and in making the upward stroke of the leg of his g's. Therefore for home exercises in writing I directed large l's made quickly and continuously, followed by the reverse of these, making m's, so as to make him write from the upper arm and shoulder. As time went on we gradually reduced these in size, so as to bring more into play the muscles of the forearm and hand. When he had become proficient in these, the next exercise was a little more difficult, and consisted of *lelelele,* large and rapid at first, then gradually diminishing, and later the exercise was *legleg,* practised in the same manner, many lines at a time, and in this way he soon got over his hitches and halts.

But calisthenics and elementary writing exercises, though helpful, have never been known to cure a case of writer's cramp without other assistance. And for this purpose I gave the fingers, hand, and arm massage, deep manipulation, almost daily for four weeks. After the first two massages the patient wrote with unusual facility, but tired as soon as usual. After the third massage he was fatigued at the end of the first line, and it is a wonder he did not give up treatment then, as these cases are apt to do. After four massages he wrote with greater ease, and made delicate movements of fingers and thumb, which he had not been in the habit of doing, and he

was but slightly fatigued with ten lines. After the third massage, which included the back, he was almost faint with hunger, though he had just had dinner before coming to me. I have observed the same effect in other cases, in one a physician, from percussion alone for a few minutes on the back. At the fifth visit there was some lameness of the muscles of hands and arms from the manipulation, which had not been rough, and this is generally a good omen. He thought the writing exercises which I prescribed for him were excellent practice to train his boys at the commercial college to write a free, easy, and rapid hand, so he used them for that purpose. After the fifth and sixth massages he wrote still more easily and for an hour and a half each time, stopping occasionally to explain to his students. At the end of nineteen days he had no difficulty in grasping his penholder, and he could write with ease for three hours, and at the end of twenty-eight days he wrote with ease and fluency and animation. And thus he improved, with variations, but all the time making a better average.

At times we had to call a complete halt for a few days in his home exercises, when it was evident that he was overdoing and getting his nerves and muscles into an irritable condition, which was relieved by massage alone. But when this condition has arisen of its own accord or from writing, in other cases, it might be an indication to urge them on with exercises in order to tire out the affected nerves and muscles and their central connections, and thus allay over-excitability. The same means incites nerves and muscles that are inactive, but here, in order to be of benefit, must stop short of over-exciting them.

Our patient might have been discharged at the end of four weeks, but this was not in accordance with his wishes, for he did not then feel safe without the aid of massage, so he continued to visit me two or three times weekly for several weeks longer. At the end of six weeks, though he was generally fatigued from sickness and death in his family, he had not the slightest difficulty in giving his writing-classes full instruction from nine to twelve o'clock, and it was during the last ten days of this time that I thought it well for him to have a tonic consisting of five minims of tincture of nux vomica, twenty minims of cascara cordial, with thirty-five drops of elixir of calisaya, three times daily. He called upon me again ten weeks from the time I first saw him to report that he had

attained perpetual motion, for the longer he wrote and the more he exercised, the easier it became and the better he felt. I have heard from him recently, and he has continued well. Without this patient's hearty coöperation he would doubtless have sunk into the slough of despond.

The two following cases are the kind not likely to be benefited by massage nor anything else:

Mr. W. was forty years of age, well nourished, and had good, strong muscles. When eight years of age he had scarlet fever, which left him with general neuralgia, from which he has never fully recovered. He was a clear-headed man of business, though he suffered from dull headache all the time, slept poorly, and woke up tired. He was not so well when on a vacation for a few days as at business. He had general feelings of burning, fatigue, and stiffness, and also heaviness of the legs. There was literally too much tension of both mind and body. He was evidently a pronounced case of neurasthenia. From the time he learned to write until he was eighteen years of age he wrote a large, free hand, but at this time he became a clerk, and wrote a small, careful hand, slowly, and with increasing difficulty. In January, 1883, he was much run down, and work was hard for him, and during the following month he had to stay at home with indefinite symptoms of prostration and fever. When he returned to business he could not write at all in the usual way, but took the pen between the index and middle fingers. At first there was flexor spasm of the fingers and thumb, accompanied with extensor spasm in dorsal flexion of the hand. After a time he was obliged to give up writing nearly altogether, so that by September of the same year he had to limit himself to the signing of his name. More than this caused the hand to tremble, the fingers and thumb to flex, then the hand would curl up in the wrist, and the cramp became so painful that he had to desist. Counting coin produced the same symptoms in the left hand. He suffered most from discomfort and tension throughout the whole of the right side of his body; his right eye was incorrigibly astigmatic, and he had had catarrh of the middle ear as long as he could remember.

He went to Europe and visited an eminent specialist twice a day for a month for massage, writing exercises, and calisthenics. He came home labelled "cured," but he could not write any better.

As he had previously been to me for his general troubles, my method of doing massage stood still higher in his estimation for his visit to Europe. So he came to me for a special trial at his writer's cramp. Under a month of daily massage with the use of Jacoby's wristlet and elastic tubes to exercise the extensors of his thumb and fingers at home and practice with Nussbaum's writing apparatus no benefit ensued. His business was in a bad state, and he was under constant worry. This is one of the cases not likely to be improved by massage, or if so, only temporarily.

Mrs. F. H. was forty-nine years of age, and for the previous twenty years had written much. Three years before coming to me she first noticed that it troubled her to hold her pen. There was nothing peculiar about her handwriting, but after a few lines the thumb slipped off the penholder by gradually extending itself (clonic spasm), and this was attended with pain in the metacarpal space between the thumb and index-finger, and at the outer aspect of the insertion of the biceps, in the region of the musculospiral nerve, as well as in the anterior fibres of the trapezius and at the base of the skull. With the pen between the fore and middle fingers she could write fairly well for ten minutes, but more than this caused pain in the places just mentioned. The whole arm felt lame and heavy. Housework, such as dusting or ironing, was difficult, and every motion of the arm caused pain. The left arm had been similarly affected for three months. After I had seen her a few times she admitted that she felt somewhat ashamed of the unusual but natural prominence of the metacarpophalangeal joints of the thumbs, and in order to partly conceal this she had been in the habit for many years of moving this part of the right thumb into the palm of the hand. Hence, no doubt, had arisen spasm of the adductor pollicis, and on examination it was found that this muscle was sore and tender. Her general health had always been delicate. She slept poorly, was dyspeptic, constipated, had uterine catarrh and various other ailments. She had been utterly proof against all sorts of medication in the hands of the most skilful gynæcologists and neurologists. Massage had no better result, but with a Nussbaum apparatus she gets along very well.

I might weary you with such doleful accounts of unsuccessful cases.

But with quite recent or incipient cases of writer's cramp and

similar troubles my experience has been much more cheerful, the patients recovering safely, quickly, and pleasantly with a very few massages, so that they remained in blissful ignorance of how near the rocks and shoals of disability they had been sailing. I will mention one. It was that of Miss E. P., twenty-eight years of age, of slight frame but tolerably firm muscles. The previous winter her arms and hands would frequently get tired from playing the piano, but would recover by resting for a day. She had the same experience the following winter before she came to me. Three days before her appearance she had played the piano for three and one-half hours, too long for her, with the result that the hands and arms were greatly fatigued, and there was twitching of the muscles and rapid, slight contractions of the fingers, alternating with a dull ache, and the whole of both arms felt lame to the shoulders. Under two days of rest alone her symptoms had become worse, and on the morning of the third day, when she first came to me, she could not turn a newspaper nor play a single note on the piano, and there was slight swelling of the affected members. Thirty minutes of stroking or *effleurage,* alternating with deep massage, at ten-forty-five A.M., was accompanied and followed by perfect comfort for six hours, and the slight discomfort which then returned was forgotten in the social enjoyment of the evening. Next morning slight return of symptoms below the elbows, none above. Massage at three P.M. with great effect. She returned again after two days' interval and reported that she had played the piano for fifteen minutes the previous evening and thirty minutes next morning with but little uneasiness. Massage of one arm, she said, relieved the other before it had been *masséed.* After the third massage she regarded herself as cured, and said that she would certainly return if she were not. As I have not heard from her, she probably fully recovered.

In this last case the advantages to be gained by months of rest were evidently made much more secure by three massages in a few days.

All the heavy armor of medical and surgical therapeutics has accomplished little or nothing in the way of slaying this Philistine which defies us in the form of writer's cramp and cognate disturbances. It required a David to meet this giant, and he has come forth as Herr J. Wolff, who, declining the lightning, the sword, and the resources of alchemy, has chosen but two long-

despised stones from the river of therapeutics, namely, massage and gymnastics, and with these in his sling he wields it with such skill, vigor, and enthusiasm that he slays the giant at almost every blow. True, David used but one stone, and the analogy does not suffer when we learn that gymnastics alone will not suffice. The use of massage and movements in writer's cramp and similar defects was well known before the time of Herr Wolff, but their superior value and efficacy were not fully demonstrated until he became interested in them and until his method and results were published by Dr. R. Vigouroux in *Le Progrès Medical* of January 21, 1882, and by Dr. Th. Stein in the *Berliner klinische Wochenschrift* for August 21, 1882, about five years after my paper on the subject in the New York *Medical Record,* which had the honor of being quoted by the *Journal de Médecine* for October, 1887, and then forgotten.*

Herr Wolff used to be a famous teacher of writing, and in this capacity he had pupils sent to him from all parts of Europe to correct their bad chirography. In this manner he became interested in writer's cramp, and he soon improved his naturally keen observation by a study of anatomy and physiology and of disturbances of the central and peripheral nervous system. "The means employed," he says, "are massage and gymnastics combined in a novel way, their effects being mutually antagonistic, and adapted to each individual case. Let us assume, for instance, a pronounced spasm of flexors. Here the muscular antagonism is physiologically altered, there is spastic contraction of the flexors and abductors. In proportion as this continues the sense of weakness increases, and the handwriting becomes more uncertain. As the contracture ceases the weakness disappears and the cramp is cured. In order to definitely find the fingers affected I perform massage of them,† partly centrifugally,‡ partly centripetally, as far as the wrist. I then cause the patient to execute different free motions such as

* When anyone not familiar with the past history of massage realizes its benefits in intractable cases, it is to him a veritable discovery, and it might be better to allow him to think that he is the first discoverer, for the resulting enthusiasm goes far towards influencing favorable results. Pursue any treatment with lukewarm indifference, and little or no benefit ensues.

† The spasm alone would indicate the fingers affected, when massage might not.

‡ Why centrifugally? It is not advantageous here.

bending and stretching, spreading and contracting, continued for hours until the hand is fatigued, and these are repeated until the patient is able to move each finger voluntarily in all directions. These manipulations carefully repeated have done me excellent service, and the affection in most cases was cured in from three to four weeks."

Dr. Th. Stein says of the method that "it rests exclusively upon active and passive gymnastics of the fore and upper arm, upon massage, percussion, and friction of the same parts, and after a time elementary exercises in writing prescribed and adapted to each case by holding the pen in a definite manner. These are gone through with two or three times daily for half an hour or so at a time. The peculiarity of the method is that Wolff, in consequence of much practice, is able by means of his hands and by elastic bands to fix exactly those muscles which require special exercises, and which we physicians and electrotherapeutists are unable to point out so exactly even with the most minute electrodiagnostic examination."

From 1877 to 1882 Wolff has treated by massage and gymnastics in all two hundred and seventy-seven cases of writer's cramp and such troubles. Two hundred and forty-five were writer's cramp, and one hundred and thirty-two of these were radically cured, twenty-two improved, and ninety-one without result. Thirty-two were pianist's, violinist's, telegrapher's, and painter's cramp; and of these twenty-five were cured. In all one hundred and fifty-seven were cured, twenty-two improved, and ninety-eight not cured.* Of the one hundred and thirty-two cases of writer's cramp cured, one hundred and eight were men, twenty-four women; eighty-eight of the men were married and twenty single. Of the women seventeen were married or widows and seven were single. Of the other forms of so-called cramp twenty-seven were men, and twenty-one of these were married; five were women, and two of these were married. Most of the women with writer's cramp were widows.

Wolff considers that the failures to cure were in part owing to want of energy and patience in carrying out the treatment, and in

* (It is not unlikely that of these ninety-eight the progress of the affection in some may have been arrested, in others retarded, while possibly in a few there may have been an apparent aggravation.)

part to central disturbances. The cases were from Frankfort, Berlin, Vienna, Munich, Dresden, Freiburg, Amsterdam, and Paris. The results are vouched for by the highest authorities: Billroth, Benedickt, and Bamberger, of Vienna; Charcot and Vigouroux, of Paris; Esmarch, of Kiel; Wagner, of Leipzig; Bardeleben, of Berlin; Hertz, of Amsterdam, and Nussbaum, of Munich.

Two cases that were sent by Charcot to Vigouroux for electrical treatment were consigned by the latter to Wolff. Both were cured in fifteen days. The first was M. D., twenty-five years of age, robust and vigorous, who had written rapidly twelve hours daily during the preceding winter. He had been unable to write for five months. There was functional spasm of the long flexor of the thumb, first interosseous, and external radials; increased excitability to electrical and mechanical impressions, and also of tendon-reflex. The patient was anæmic and slept poorly, but these were overcome by static electricity without improvement of the hand. Galvanization, and later galvanization and faradization, were used for three months without relief. Cured in fifteen days by Wolff. The second case was M. F., draughtsman, twenty-seven years of age and robust. He used the left hand easily for writing and drawing, as he had suffered three years from spasmodic movements in the right hand if he attempted writing, drawing, turning the leaves of a book, or twisting his moustache. At the end of fifteen days' treatment by Wolff he wrote and drew rapidly and easily in the presence of Charcot and Vigouroux. Wolff freely shows his method to physicians, but he cannot transmit his experience, skill, and medical instinct.

Dr. Th. Stein says he has been convinced of the amazingly valuable results of this method of treating writer's cramp by the observation of ten cases which he sent to Wolff. The outline of five of them cured within four weeks is given, and the results in the others were similar.

Case I.—A. R., forty-five years of age, strong and muscular, had suffered with writer's cramp for ten years. It began mildly with slight pain in the forearm and finger-joints, but he continued to write for two years, at the end of which the pain was concentrated in the thumb and fore and middle fingers, and became cramp-like on attempting to write, and finally he could not hold

the pen at all. Even trying to sign his name occasioned great straining and nervous excitement, so that perspiration broke out. Divers treatments had no effect. He was assigned to Wolff, who treated him twenty-six days, and then he could write swiftly and beautifully. Six months later he was still well.

Case II.—J. B., forty-two years of age, tall, slim, pale, but well. Right arm very thin, pain in the upper arm to the shoulder; complains of tension and fatigue through the whole arm. He can do everything but write. On attempting this the hand turns from left to right at the wrist, and the upper arm presses itself involuntarily against the side of the chest. The patient writes one line clearly, the second less so, and at the end of the third the cramp-like feeling comes on, and the upper arm resists powerful attempts to pull it from the side. Any further trial of writing causes him to tremble all over and seem greatly excited. After a rest of five minutes the same symptoms came on at the end of the first line with acute pain in the arm and hand. Dr. Stein turned him over to Wolff, and he was astonished at the end of three weeks to see the patient looking better, fresher, and more cheerful, and to find him perfectly cured. He wrote with ease and speed, and the arm was firmer and stronger.

Case III.—M. S., twenty-seven years of age, thin, tall, and feeble, has suffered for four years from writer's cramp. Writing had always been difficult and tiresome to him. After great physical exertion four years previously he could not write so well, and there was increasing weakness in both arms. By the advice of a physician he went to a gymnasium, and the exercise increased the strength of his arms and hands, but the writing still became worse. An attempt to write with the left hand brought on the same trouble as in the right, which was upward spasm of the hand. Pressing it down brought on trembling, and changing the position of the pen was of no use. After four weeks of Wolff's treatment he was well, writing better than ever, and in his former position, that of a clerk.

Case IV.—H. P., fifty years of age, muscles moderately developed and well in every respect, save that he has suffered from writer's cramp for fifteen years. The flexor spasm was so strong that he involuntarily crushed objects. Writing was troublesome, trembling and bad, and of very short duration. He had been treated in various ways for five years without benefit. After

five days under Wolff there was gradual increase of flexibility of the arm and less contraction of the fingers. Cured in twenty-four days, and well a year later.

CASE V.—M. L., twenty-six years of age, had suffered for a year from writer's and pianist's cramp. Patient of medium size, well, and moderately strong, no nervous troubles in her family. She complains of pain in the upper arm, wrist, and fingers, felt particularly on awaking. Upon playing the piano for five minutes both arms are so tired and languid that she has to stop. She cannot write at all. During the first eight *séances* only gymnastics were used, but with no benefit. After this Wolff *masséed* both arms three times daily, half an hour at a time. The pain gradually disappeared. Then massage and gymnastics were combined and occupied most of the day, and after fourteen days more she was cured of her malady and could write and play on the piano continuously.

Dr. Stein concludes by saying that only those physicians who devote themselves to massage and gymnastics could succeed in obtaining such excellent results as they have done in other affections of joints and muscles. Neither Herr Wolff nor the Drs. Schott, says he, can be vindicated in their claims of priority for the first idea of the treatment of writer's cramp and such defects by massage and gymnastics, however perfect they may have become in carrying these out. Weiss, Podrazky, Zabludowski, and Cederschjöld also report favorable results from massage in writer's cramp, though their experience has been but limited.

The result of this treatment by Wolff in cases other than those in which spasm and tremor are most prominent only appears in the case No. V. of Stein, which was unusually obstinate. In three of my own cases the results of massage and movements, and subsequently the use of electricity and injections of strychnia, were unsatisfactory, though the affected limbs became stronger and uncomfortable feelings disappeared. They all arose from over-use. One was inability to write, another could not play on the piano, and the third experienced great difficulty and discomfort in telegraphing. They presented the usual symptoms of such affections *except the spasm and tremor.* So far as we can learn these two symptoms were the most marked in Wolff's and other successful cases; it would be of interest to learn if they were absent in his

unsuccessful ones, as I suspect may have been the case. The courage and perseverance of many patients have, in later years, taught me that it is not well to give up treatment when sufficient improvement has not been gained in a month.

The advantages of massage and gymnastics in the majority of cases of writer's cramp and allied affections would seem to be removal of painful fatigue, spasm, tremor, weakness, incoördination of motion, feelings of constriction or tension, and disturbances of sensation; in one case dispersion of a neuroma,* in another absorption of œdema and infiltration of the connective tissue. Hence, so far as we can judge, this method is capable, in many cases, of fulfilling therapeutical indications of the utmost importance, such as removal of increase and decrease of resistance in the paths of conduction, excitation, and motion; restoration of harmonious coöperation of individual movements, of natural conductivity and excitability, as well as of muscular sense and muscular effort; in a word, correction of underaction and overaction of muscles, nerves, and their central reflex apparatus. Impalpable trophic disturbances of the coördinating machinery in the central nervous system are regarded as the origin and predisposing cause of writer's cramp and such maladies. If massage excels galvanism in correcting these disturbances, as would seem to be the case, it must indeed be a remedy of rare value and worthy of being used by the most skilful physicians. But wherein lies the unity of Wolff's brilliant results? Evidently it is in tiring out the affected muscles, nerves, and their central connections, thus allaying over-excitability, which manifests itself mainly as spasm. The same means incites nerves and muscles that are inactive, but to be beneficial, evidently, must stop short of over-exciting or tiring them out. Hence the necessity of careful diagnosis and tolerable precision in using massage and movements in these cases. When peripheral nerves and muscles are less excitable than natural there is absent or defective contraction.

It is true of massage, as of everything else, that one person may succeed with it when another has failed. Of the galvanic current Professor Erb says: "I have thoroughly satisfied myself

* So good an observer as Billroth thinks he has seen tumors dissipated by massage.

of its efficacy in writer's cramp and allied affections, though I have not been able to establish the superiority of any one method of applying it over the others. When good effects have followed, the same results were obtained from all modes of applying it to the arm and neck." He might have added that it could be applied in such a way as to be useless or harmful, and so also might massage.

In other irregular actions of nerves and muscles massage has been found advantageous after the failure of other means. Dr. Beyer, in the Philadelphia *Medical News* (April 11, 1885), has reported a case of tonic spasm of the spinal accessory nerve of central origin, manifested by obstinate contracture of the trapezius and sterno-mastoid muscles, that had existed for eighteen months and defied all other treatment, such as nerve tonics and sedatives, electricity, and injections of atropia. The case was effectually cured in nine months by massage and movements.

Posture, massage, passive stretching, and resistive movements are coming more into use in the treatment of wry-neck. Alone they may suffice to cure mild cases, and in the more severe they form a good treatment to prepare the way for operation, and afterwards to restore strength and motion to the muscles. Dr. E. G. Brackett thus speaks of such measures: "The muscles holding the head must be so readapted to the new position that they will no longer tend to draw it to an abnormal position. This can only be accomplished by systematic massage and exercise. The patient should lie with a roll under the neck and the head turned to the opposite side, and while in this position deep massage should be practised on the contracted structures and on the trapezius of the opposite side. When possible, resistive motion should be given to the muscles opposing the contractured ones.

XVI.

Massage in Neuralgia and Peripheral Paralysis.

"The same nerves are fashioned to sustain
The greatest pleasure and the greatest pain."

In neuralgia of milder form and in what seemed to be the incipient stages of more severe attacks, as well as in old cases of neuralgia where everything under the sun had been exhausted but massage, this has been tried, and it has not been found wanting in favorable results. Used between the paroxysms of severe neuralgic pains, massage generally lengthens the intervals between the attacks and lessens the severity of these when they come on. In all of the cases which I shall refer to where massage was employed, other means, constitutional and local, had not been neglected, and it was usually after the apparent failure of these that this measure was brought into use.

Pain arising from disturbance in the central nervous system is, as we have seen, frequently relieved by massage, whether this has any effect upon the cause of it or not. How much more effectual then ought manipulation to be in peripheral neuralgia, where the affected nerves can be reached? If the old view of Anstie be accepted, which would explain every neuralgia arising with or without apparent cause as consisting in atrophy of the posterior roots of the spinal nerves in which the pain is felt and of the neighboring central fibres and ganglionic cells, we must conclude that the sedative effect of massage reaches far beyond the region of application. The opinion of Benedict that at least all peripheric neuralgiæ are due to slight neuritis does not necessarily conflict with that of Anstie. Either or both conditions may be present, but slight neuritis would be the more encouraging for the employment of massage. Evidently the less neuralgia is dependent upon disorder in other organs, the better is the prospect for relief from treatment by massage. Disturbances of sensation from too great tension or relaxation of the tissues offer favorable conditions for treatment by manipulation. When neuralgia is not in nerves too deeply situated, and has lasted but a short time, massage is considered

by Johnson and others the best remedy of all. In well-marked degeneration of nerves, and when neuralgia is dependent upon mechanical pressure that cannot be removed, we would not expect any result. In the early and late stage of neuritis massage is indicated; in the early, it would act as a prophylactic, relieving congestion by causing a free circulation in the surrounding tissues and by pushing the blood out of the distended vessels where accessible; in the late, by causing absorption of inflammatory products. When the inflammatory process is on the verge of softening and suppuration manipulation would be questionable. Impalpable disturbances of nutrition and undue molecular activity or passivity, whether as cause or consequence of neuralgia, are undoubtedly favorably influenced by massage. The repeated mechanical effect of manipulation and percussion upon old neuralgiæ benumbs and lessens the sensibility of the nerve-filaments and gradually decreases it. In other words, nerves that are already in a state of painful excitement may have this reduced by over-inciting them and thus wearing out their incitability. A temporary aggravation of pain is likely to occur at first, especially if light and rapid percussion be used; whereas if slow and heavy blows be given, an obtunding effect will probably set in at once.

Massage, if used at all in recent and severe neuralgia, should be by gentle stroking, firm pressure, and slow, deep kneading, which will favorably modify the excitations of the painful nerves. Recent cases would seem to require more time for treatment by massage than old cases. Those in which I have met with failure from massage have been cases where the constitution had been run down and the mind harassed by cares, and where massage had been urgently requested by the patient in the lull between the paroxysms. Under such circumstances manipulation is likely to reawaken the pain. Neuralgia of anæmia and malnutrition may be successfully treated by tonics, nourishment, rest, and massage.

It has long been recognized by Anstie and others as a diagnostic feature of neuralgia that, notwithstanding the tender spots at various points of the affected nerves where they emerge from deeper to more superficial structures, firm pressure may be made on the painful nerves without aggravating the pain, and very often with the effect of relieving it when rest alone does not. The wonder is that this hint has not been more utilized in practice, and that

there are not more claims of priority for the use of massage in its various forms for the treatment of neuralgia. Dr. Balfour, of Edinburgh, in 1819 implied that he was the originator of the treatment of neuralgic and other pains by compression and percussion. The *value* of these, when skilfully used, certainly was a discovery, as was the value of massage in depriving rest of its evils and stimulating nutrition, and also its benefits in the cure of writer's cramp, sprains, etc. Such learned authors as Trousseau and Pidoux have unconsciously been led into error by stating in their treatise on "Materia Medica and Therapeutics" that one Sarlandière was the originator of massage by percussion. Twenty-five years before this, in 1818, Percy and Laurent devoted an article to percussion in their "Dictionary of the Medical Sciences," proving its use among the ancients. But they all seem to have overlooked the fact that the history of percussion extends far back, even into mythology, for Jupiter once needed his thunderbolts, which were forged by Vulcan, because the Titans tried, by piling up mountains upon one another, to scale heaven and throw him down. Jupiter, finding himself hard pressed, was seized with a severe pain in his head, which caused him to bid Vulcan to strike it with his hammer. This done, out darted heavenly wisdom, his beautiful daughter Minerva, fully armed, with piercing, shining eyes, and by her counsels the Titans were cast down. There has been wisdom in percussion ever since when properly used.

Nerve excitation and vibration for the relief of pain and other morbid symptoms by means of percussion have become of great interest and importance from the scientific and successful experiments of Dr. J. Mortimer Granville, of London. Acute and sharp pain he likens to a high note in music produced by rapid vibrations; while a dull, heavy, or aching pain is similar to a low note or tone caused by slow vibrations. A slow rate of mechanical vibration upon the nerve interrupts the rapid vibrations of acute pain, while quick vibration arrests the slower ones of dull pain. By thus introducing discord into the rhythm of morbid vibrations relief or cure in neuralgia is effected. This is accomplished by means of an instrument called a *percuteur,* which is so constructed as to give at will a slow or rapid rate of blows per minute. In a large number of cases by this means the cerebrospinal and sympathetic ganglia can be brought under control, torpid centres aroused

to action, reflex irritability of subordinate centres subdued, and these centres placed under the control of the higher ones; the vibrations can be propagated along the trunks and into the branches of the principal nerves from their centres of origin, or called into action reflexly by the afferent nerves connected with those centres. In no instance has there been failure to produce activity of the bowels, even when they have been previously obstinately constipated. "In the treatment of pain by vibration it is necessary to determine, as precisely as possible, the particular nerve-branch in which it is located, and to act upon that branch alone. The treatment will fail if healthy or normally vibrating nerves are mechanically vibrated with those which are in a morbid state. The rationale of the process of relief is to overpower the tumultuous vibrations of the nerve-elements within the sheath." Dr. Granville considers the rate of speed of great importance, but admits that it can only be approximated in any given case by trial, for he says that when the pain of neuralgia is not quickly relieved by vibration it is wrong to continue working at the same rate of speed, as it is likely to aggravate the suffering. Others do not consider the rate of speed as of much importance.

Amongst my early experience with massage, more than thirty years ago, there came to me an elderly clergyman using two canes for support. He had suffered for many months from sciatica and not a little from the treatment of the same by blistering, cauterization, etc., which had no doubt been of benefit. The affected leg was weak, cold, and flabby, and there was subacute pain in the course of the sciatic nerve and its branches. Massage was applied every other day, and at the end of a week it was surprising that he no longer used a cane, and in two weeks he considered himself well. At an earlier stage, probably, massage would not have been so rapidly beneficial.

In 1878 I attended Mr. T. D., then sixty years of age. Thirty-five years before he had been stabbed in the left lumbar region. The wound healed and he had no special trouble from it for thirty years, except that he was painfully conscious of weakness in the left side, arm, and leg. For the last five years he had suffered from attacks of burning, boring pain in the course of the left ilio-hypogastric nerve, extending from the cicatrix of the stab to the emergence of the nerve just above the left pubic bone. The attacks

were paroxysmal, came on suddenly, with no premonition, and went off as they came. They lasted from one hour to two days with slight intermissions, and were so severe as to "double up" the patient, and hypodermic injections of morphia had to be used. The attacks occurred sometimes two or three times a week, at others only once in four or five weeks. During these intervals the patient considered himself well, though in the remissions of pain he was peevish and irritable. During the attacks the bowels were distended with flatus, the passing of which, either up or down, afforded relief. The tissues felt lame and bruised in the painful region. When I was called to the patient he was in the height of an attack, pulse ninety and feeble, respiration hurried, and he looked pale and exhausted. Massage for half an hour gave him great relief. An hour later he expelled flatus freely by the rectum, and soon after went to sleep and did not wake up till morning (nine hours after my visit). The massage of the back and abdomen was repeated next day and twice a week afterwards for five weeks. I also gave him a pill of iron, quinine, and nux vomica three times daily, and he gained in flesh and strength. A year later there had been no return of the attacks.

Mr. S., sixty years of age, in ordinary good health, came to me with supra-orbital neuralgia, which had troubled him for a year in spite of tonics, sedatives, liniments, and electricity. I gave him nine massages in three weeks, and he was so much improved that the slight pain remaining soon disappeared without further treatment.

J. R. A., fifty-five years of age, a painter, was kindly referred to me by Dr. Denny from the out-patient department for nervous diseases at the Boston City Hospital. The case was one of traumatic neuritis and paresis, caused by a fall on the shoulder three months before. Motion of all the joints of the right arm, from shoulder to fingers, was stiff and limited, about one-half normal; wrist and fingers swollen. The posterior interosseus and median nerves seemed to be most affected by the neuritis, and the patient was often kept awake by the pain. He was slowly improving before he came to me. In three weeks I gave him twelve massages, applied bandages tightly, and used passive and active motion freely, and at the end of this time he had so much improved that he could resume his occupation.

Dr. S. Weir Mitchell at page 271 of "Injuries of Nerves" reports the following case: "A case of contusion of the ulnar nerve became subject to intense neuralgia, the nerve being hardened and enlarged, owing probably to subacute neuritis. It was very tender, and no application of electricity was borne. The patient was relieved by hypodermic injections, but after using many remedies, and at last the actual cautery over the nerve-trunk, without altering its size and tenderness, I patiently tried whether by slow and careful manipulations I could enable it to bear pressure. After a course of gentle friction lasting half an hour I succeeded in my object, and three sittings enabled me to rub and even knead quite roughly the diseased part. After some thirty sittings he could readily bear the use of ice, which before he could not endure, and the nerve was plainly less in size and of diminished density. This very instructive case has taught me in other instances to help the progress of the nerve towards health by like means whenever there are tenderness and sclerotic conditions. I need not say that some tact is needed in slowly increasing the force of the friction and depth of pressure." In this case massage proved more serviceable than the cautery, ice, morphia, or electricity.

Berghman reports three cases of hopeless neuralgia cured by massage when everything else had failed.* The first was that of a woman who had suffered from severe neuralgia of the ulnar nerve for four and a half years. The pain was so violent, and the inability to do the least thing so great, that for sixteen months she had been in a home for incurables. The ulnar nerve was painful in its whole extent, but worst at the elbow. There was no swelling apparent. Massage was used daily, and in six weeks she was free from pain and soon after was perfectly able to work. After eleven sittings she was free from pain for a whole day, and after eighteen for two days, and so the patient progressed.

A man, fifty-four years of age, had suffered from neuralgia of the trigeminus in the left side of the face for five years. The pain was very intense, with exacerbations every five minutes by day and continual disturbance of his sleep by night. After six days of

* Virchow and Hirsch's Jahresbericht, 1874. From Scandinavian medical journals.

treatment by massage he obtained intervals of freedom from pain of three-quarters of an hour, in three days more the intervals of relief were two hours, and after ten days the pain ceased entirely.

A single woman, thirty years of age, had suffered for more than two years from the usual symptoms of coccygodynia, pains over the sacrum and buttocks made very intense by pressure upon the extreme end of the coccyx. Massage was used daily, and after eight days she was well and has continued so ever since.

Dr. L. Faye reports the following two cases in *Norsk. Mag.*, 3 R. V. 12, 1875. A woman, twenty-five years of age, who had been pregnant for two or three months, was suddenly attacked with sciatica, and could walk and lie upon the affected side only with great difficulty. Various remedies had been used without result. After daily massage for a few days the patient could walk without much difficulty, and after eighteen sittings the cure was complete and lasting. It was only after the patient recovered that Faye learned that she was pregnant. If he had known this before, he would not have used massage. In view of this result it is well that he did not know of her condition.

A man had a peculiar sensation in the neighborhood of the perineum, which was sensitive to touch. The nature of the affection was obscure. Hypertrophy of the prostate could not be made out. Later there came pain in the back and sides. The most varied treatment had been of no use. After thirty-six massages the patient was cured. A slight return of unpleasant sensations was removed by percussion.

Dr. Carl Gussenbauer, professor of surgery at Prague, has treated three cases of neuralgia successfully by means of massage.* One of these was a man, thirty-four years of age, who had contracted the malady by standing on a cold stone sidewalk. He had been treated by several physicians without benefit, only the use of the faradic current having afforded temporary relief. Later Töplitz thermal springs were tried, but did no good. The patient walked as if he had inflammation of the hip-joint, but examination showed this not to be affected. In the course of the exit of the right sciatic nerve were found two knotty indurations which were painful to a slight touch. The whole sciatic nerve was also very

* Erfahrungen über Massage.

sensitive to pressure. Electricity was again tried, but the patient declared that he grew worse. Fly-blisters afforded some relief. Massage was applied over all the affected parts of the sciatic nerve, but especially upon the indurations. These disappeared gradually, and with them the pains, and at the expiration of four weeks the patient left the clinic cured. The next case of Professor Gussenbauer was one of neuralgia of the *nervous cutaneous femoris medius* of six weeks' duration, caused by taking cold. In the course of eight days, with two massages daily, spontaneous pains and sensitiveness to pressure had entirely disappeared and motion had become perfect. In this case there was a painful point where the nerve came through the fascia lata. The other case was also one of sciatica of several years' duration, treated by massage with similar results. The professor says he could narrate many other cases showing the benefits of massage, and believes that this remedy will find its way more and more into medical practice if physicians will only once prove its results.*

Norström reports a number of cases of neuralgia treated by massage. Mme. M., thirty-six years of age, came to him in January, 1882, for a violent pain of three months' duration seated in the frontal region and all over the nose, affecting the nasal, frontal, and lachrymal branches of the ophthalmic, so severe as to deprive the patient of sleep. The secretion of the pituitary membrane was notably increased, and a paroxysm of pain occurred every time the patient attempted to blow her nose. Electricity had been used three months without result. Friction with various preparations had no effect. Cured by eighteen massages, and no relapse. Another was a case of cervicobrachial neuralgia extending to the ulnar nerve, of several years' duration, cured by thirty massages. One was a case of rebellious sciatica with myositis of the sacrolumbar and posterior femoral muscles with contraction of six years' duration, cured in four months. A case of double sciatica of rheumatic origin in a fat patient was much improved by massage at the time of publication. Still another was a case of acute sciatica during

* "Ich könnte Ihnen, meine Herren Collegen, noch manche andere Beobachtungen anführen, ich glaube indessen, dass die bereits erwähnten wohl geeignet sind, Ihr Interesse für die Massage zu erwecken, die nach meiner Ueberzeugung immer mehr Eingang in die ärztliche Praxis finden wird, wenn sie einmal von den Aerzten selbst mit Erfolg geprüft sein wird."

acute rheumatism, in which the sciatica got well under massage before the rheumatism did under constitutional treatment. A case of sciatica of seven months' duration without known cause, in which blisters afforded temporary relief, got almost entirely well in twenty-three days under massage and had no relapse. Mme. D. had suffered for a number of weeks from neuralgia of the femoro-cutaneous nerves, which was aggravated by change of position. She was cured in ten days by massage.

Dr. P. Winge has reported a case of double sciatica of nine years' duration, which came after the use of firm compresses applied to the legs during bleeding from the uterus, that was cured by massage in three months.

To 1878 Johnson had treated by massage seventeen cases of neuralgia.* Fourteen of these were sciatica, and eight were cured, four improved, and two unchanged. Three were neuralgia in other nerves, and they recovered. The number of sittings required was from twenty-seven to fifty-two. These cases were recent, the neuralgia not being of long duration.

Zabludowski reports four cases of sciatica and one of intercostal neuralgia cured by massage (*Deutsche medicinische Zeitung,* 1884). Numerous other interesting accounts of cases of neuralgia of long standing treated by massage are given, but space forbids their repetition here. Wagner † considers massage particularly useful in peripheral paralyses and neuralgias. The affected nerves should be stretched and kneaded so as to aid in the removal of hyperæmia and exudation. In three cases of sciatica he obtained cure in one at ten sittings, in another amelioration after twelve massages, and in a third case of six weeks' duration no result after fifteen *séances.* It is noteworthy that this last case was subsequently defiant to every other means, including the continued current, and lasted four months in spite of everything.

A case of supra-orbital neuralgia was much improved by eight massages.

In nervous headache and hemicrania massage does equally as well as in neuralgia elsewhere. Schreiber, Wretland, Westerlund, and others also give favorable accounts of the use of massage in neuralgia. But enough has been said.

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* Virchow and Hirsch's Jahresbericht, 1878.

† Berliner klinische Wochenschrift, November 6 and 13, 1876.

In *peripheral paralysis* massage proves useful. In one case of facial paralysis of several months' duration, arising from exposure to cold, that came under my care the patient rapidly improved and soon got well. Gottlieb reports the case of Mlle. N., twenty-two years of age, who came to him October 28, 1873. Three months and a half before, without known cause, there appeared a tumefaction and deviation of the left half of the face, which still continued. No cerebral affection nor syphilis was present. No treatment had been used, and she had improved but little. The ala of the nose and the tissues over the superciliary ridge were depressed, but there was no ptosis. There was slight sensibility around the orbit and nostril. There was no spontaneous pain, but sensation of tension in the cheek. The movements of the face were characteristic of facial paralysis. The brow did not wrinkle on the right side; the eye could be only half shut, and the patient could not whistle. There was neither epiphora nor strabismus. The tongue moved naturally. Electric contractility absent. After twenty *séances* of massage the mobility of the muscles of the face had returned to a normal condition and the patient was well December 19, 1873.

Cases of facial paralysis are not infrequently seen where nature alone has ameliorated this condition immensely, if not performed a remarkable cure, by the formation of new contractile connective tissue on the still paralyzed side, so that the face is pulled almost, if not quite, straight. In milder cases massage with or without galvanism and suitable internal remedies will often bring about recovery.

Berghman and Helleday report a case of paralysis of all the muscles of the forearm, in which, after the first sitting of massage, there was evidence of muscular contraction in the power of slightly moving the fingers. After three weeks of this treatment motion had perfectly returned. Cause and duration of the trouble not stated.

G. G. was a delicate child, ten years of age. She had been severely beaten by a boy two years before I saw her. Six weeks afterwards paralysis of the deltoid set in, which still continued. There was no periarthritis, contracture, nor muscular stiffness. She had had two attacks of rheumatism, one before and one after the beating. The arm could be elevated by another without resistance. The strength of the hand and arm was good, though the mu-

cles were considerably atrophied. For three months before I saw her she had pain in the arm and shoulder, in the back and front of the forehead, and also in other places. Massage for a while, in conjunction with cod-liver oil and tonics, did her no good.

Miss P. was seventeen years of age when I was called to her. She had generally been strong, having ridden much on horseback. Two years before I saw her she had fallen down six steps of stairs, the force of the fall coming upon the right hand, which was forced into extreme dorsal flexion. Following this there was numbness, swelling of the back of the hand, and pain of the whole arm extending over the shoulder. She had to carry the arm in a sling for two months. A year later she had recovered so that she could play on the piano for three-quarters of an hour, though the arm did not feel well. Very soon after this she had typhoid fever, which laid her up for four months. The hand and arm relapsed and baffled the attempts of a skilful neurologist and *masseuse* to improve it. She could play but five minutes on the piano, and then pain and discomfort caused her to stop, when I first saw her. Trilling caused the most pain and uneasiness (accomplished mainly by the interossei muscles supplied by the ulnar nerve), while heavy notes were easier. The ulnar nerve above the elbow was tender to pressure, and over the middle third of the radius there was tenderness and induration in the course of the *flexor longus pollicis*. After a week of daily massage and careful movements she could throw the whole arm upward and backward without discomfort in the course of the ulnar nerve, which she could not do at first, and in another week all tenderness had disappeared from it. The induration and soreness of the long flexor of the thumb did not disappear until the end of the third week. It was then that I allowed her to resume piano practice, first one minute at a time, followed by massage, then two minutes, after which massage, and so on until in three months she could play two hours daily without fatigue or discomfort of any kind. She has continued well.

XVII.

Massage in the Treatment of Muscular Rheumatism and Neuritis.

Our organs become more dry, tough, and rigid and sooner unfit for use by prolonged cold methods of hardening which also bring on premature old age and speedier dissolution.—*Abbreviated from Hufeland's "Art of Prolonging Life,"* 1790.

THE symptoms usually designated by the somewhat vague and unsatisfactory expression, *muscular rheumatism,* whether occurring in those who are rheumatic and suffer more or less from rheumatism or occasioned by injury, sudden or violent strain, excessive fatigue, or catching cold, almost always disappear in a very satisfactory manner under treatment by massage when the affected muscles and fasciæ are accessible to touch and pressure. The term myositis would be more appropriate for the majority of these cases, and would be in harmony with what we know of somewhat similar disturbance affecting involuntary muscles, as in myocarditis and chronic metritis; and at the same time it would indicate more clearly the nature of the malady and the treatment required. In recent myositis massage acts directly in squeezing the congestion out of the affected tissues and promoting absorption of exudation, thus removing hinderance to the circulation and pressure from terminal nerve-filaments. It also sets free muscular fasciculi from minute adhesions which are the cause of partial, irregular, and painful contraction. Indeed, all the local requirements are met by massage, and not infrequently at a single sitting. M. Martin, a surgeon of Lyons, cured his *confrère,* M. Petit, of an acute lumbago at a single sitting of massage. He says he has collected over a hundred cases of this kind, and recommends that the massage be repeated in order to confirm the cure.*

In chronic cases of myositis, where proliferation and induration of the connective tissue have taken place, with secondary atrophy of muscular fibres and consequent interference with motion, circulation, and innervation, massage will naturally take longer time,

* Estradère, Du Massage, pp. 108, 142.

but the result in promoting absorption and bringing about a natural state of nutrition and elasticity of the affected muscles is no less satisfactory than in recent cases. The feeling of the affected muscles in old cases, where they can be reached by manipulation, is peculiar. It is neither the natural semi-solid condition of relaxation nor the elastic hardness of contraction, but like strands of whip-cord, with here and there hard nodules, and sensitive to pressure. Pressure of the affected parts of the muscles upon adjacent nerves may cause more pain in the distribution of these nerves than is complained of at the seat of the myositis. Indeed, the same pathological conditions may also affect nerves and their sheaths. But alteration of consistency cannot always be detected even in muscles that can be easily felt, and the same subjective symptoms may be complained of in muscles that are weak, lax, and flabby, probably owing to neuralgia of the intramuscular terminations of sensitive nerves from lack of nutrition. Here it would only be a question of improving nutrition, which may be done by massage and exercise. Tension of tissues which are very expansible causes little or no pain. Swelling of the spleen almost always develops without pain, and hyperæmia of the liver usually attains a high degree before the attention of either patient or physician is called to the increase in size. But tension of membranes, ligaments, and tissues which are stretched with difficulty excites severe pain.

The muscles of the lumbar region and their fascia are a favorite seat for muscular rheumatism, which is then called lumbago, as everyone knows. The pathology of this affection is probably coagulation of the semi-fluid contractile muscular substance and adhesion of muscular fibrils, so that attempts at motion are accompanied with partial, irregular, and painful contractions. Retention of waste products occurs, and it is pretty generally conceded that uric acid is the worst of these, thus adding "fuel to the fire" and pressure upon nerve-filaments. Recent cases of muscular rheumatism are sufficiently common to anyone engaged in the practice of massage. They are almost invariably cured by a few massages, sometimes by a single massage. The same result may be brought about by rest, by warmth, by electricity, or by the administration of medicines that eliminate uric acid, such as salicylate of soda, though I think not so soon. Any of these may be used separately, combined, or with massage, thus affording us a choice of one hun-

dred and twenty combinations of these five measures ($1 \times 2 \times 3 \times 4 \times 5 = 120$). But which of these is the most effective single agent could only be determined by the sceptical if they could have lumbago or muscular rheumatism sufficiently often to try each one separately, and massage last of all; for in therapeutics this is a science of experience, and not one of experiment, as it would be in physiology when tried on healthy persons. A wearisome detail of cases of recent muscular rheumatism successfully treated by massage is unnecessary. In these cases massage produces changes in five different ways,—mechanical, thermal, electrical, nervous, and chemical. The *mechanical* change is shown by muscular rigidity being replaced by suppleness and elasticity, minute adhesions having doubtless been detached and the coagulation of the muscular substance replaced by the semi-fluid condition. The matting together of skin, superficial fascia, and deep fascia is also removed by appropriate massage, so that the skin glides more freely over the tissues beneath it. The pressure of the previous turf-like condition is taken away from the vessels and nerves so that patients feel lighter and more supple and freer from restraint. The *thermal* change is evident from the increase of heat, imparted from the hand of the manipulator as well as that arising from the massage and from the accelerated circulation. The *electrical,* also an objective change for which we do not need to take the patient's word, is manifest by more vigorous and agreeable contraction of the muscles to the faradic current after massage than before. For the *nervous* change we have to take the patient's word for improved sensation in the disappearance of pain, discomfort, and the feeling of stiffness. The *chemical* is inferred from the removal of waste products and from the increase of uric acid and leucomaines in the urine, by the increased circulation and flow of lymph, which in plain language removes the ashes, flushes the *sewers,* and takes away asphyxiated juices, while the increased arterial current brings a greater supply of nourishment, otherwise improvement would hardly take place. The constipation of the tissues is got rid of, let the refuse matter be what it may.

Dr. Haig has shown pretty conclusively that when chilling of the surface checks the excretion from the skin, diminution of the alkalinity of the blood and retention of uric acid take place in the tissues beneath. The same result follows when fibrous tissues have

been injured, strained, or excessively fatigued: uric acid accumulates in the affected parts, superadding its irritating properties, and this may be abstracted from the blood to such an extent as to show an increased alkalinity of the urine owing to diminished excretion of uric acid. This condition can be got rid of by salicylate of soda or by alkalies. When recent it can also be more promptly dispelled by means of massage, thus showing that this has brought about chemical changes. If massage and alkalies or salicylate of soda be used simultaneously, the medicine will act more quickly by reason of the improved circulation resulting from massage—as most, if not all, medicines do when the case is such as to admit of massage. This is a fact too often unrecognized, and frequently redounds unduly to the credit of massage; as when a patient has for a long time been taking a remedy that is clearly indicated, but shows no improvement until massage has been used. On this subject let us hear from old Fuller in his "Medicina Gymnastica," published in 1771: "It is to be considered that some medicines may require exercise (of the patient) in order to enhance their virtues or to remove some inconvenience attending their operation which might deter people from using them so freely as they ought to do. The ordinary circulation of the blood may not suffice to answer the nature of some medicaments and call out their efficacy. Exercise in such cases is like the just and exact incubation to the egg—that which animates the drug and gives it power to produce the desired effect."

It is hardly necessary to state here that whatever treatment be adopted for acute muscular rheumatism, the diet should be regulated, and highly nitrogenous foods and acid wines interdicted for a time.

Zabludowski, Hopadzë, and others have found by careful observation that general massage on healthy people increased the excretion of urates and phosphates and the assimilation and metamorphosis of nitrogenous food substances.

As to the mechanical effect of massage we might learn a lesson from nature. Adhesions of the pleura are often detached by the rubbing together of the two membranes in respiration. The fascia of muscles is a sort of pumping arrangement by which lymph is sucked out of the muscles and propelled onward into the lymphatics. It consists of two layers, between which are lymph-spaces termi-

nating in lymphatic vessels. When the muscles contract the inner layer is pressed against the outer and forces the fluid onward into the lymphatic vessels; when the muscles relax the inner layer recedes from the outer and the lymph from the muscles finds its way into it and the lymph-spaces between. Hence by the contraction of muscles waste products are washed out of them by the flow of fresh lymph. But patients with a severe attack of lumbago cannot exercise. In such cases massage is more than a substitute for exercise, so much more, indeed, as the pressure of massage may be greater than the pressure which muscles make upon one another during contraction.

The difference in the consistency of muscles is of much interest. The muscles of some very strong people are soft and flabby when relaxed; of others, hard and firm. This difference is no indication of muscular power or the want of it. It is due to the condition of the fascia that surrounds the muscles. When this is thick it gives a feeling of hardness; when thin, of softness. The contractile substance of muscle is semi-fluid, as has been shown by Kühne. The same difference exists in dogs and other animals. The muscles of short-haired dogs are usually hard and firm; of long-haired ones, soft and flabby; and Ludwig has shown that the former yield much lymph, the latter little. T. Lauder Brunton is of the opinion that this difference in the deep fascia may account for the tendency to muscular as distinguished from articular rheumatism. Where muscles are soft from thin fascia the tendency to muscular rheumatism is probably greater; whereas persons whose muscles feel hard from thick fascia most likely have a tendency to articular rheumatism. When the fascia is soft and thin the products of waste from over-exertion or other causes would incline to remain and occasion muscular pain; when the fascia is hard and thick, waste products would be removed more quickly from the muscles and might give rise to inflammation of the joints.

There must be much truth in Dr. Brunton's opinion, for I have seen cases of muscular rheumatism where the muscles felt preternaturally firm and hard, so much so that one might imagine that a quantity of plaster-of-Paris had been injected under the skin and allowed to set, which under massage became soft and supple as they improved. The following case, though a somewhat obstinate one, is an example of this:

Mr. J., a large, stout gentleman, had been subject to attacks of rheumatism in the trapezius, deltoid, or lumbar muscles all his life. At one time he was seized suddenly and severely with pain in the lumbar region, so that he could not even attempt to move. I was called to him the first day of this attack, and found all the muscles of his back, but especially those of the lumbar region, rigid, hard, and board-like, and almost insensitive to pressure. Perhaps the lessened sensation to external impression was owing to the already existing severe pain. Issues of vast importance depended upon his recovery in a short time, so massage was given twice daily for a week. At the end of this time the muscles were supple and elastic, sensitive, even tender, to pressure; but the pain had disappeared and the patient could move freely. He continued well for many years afterwards.

Treatment is sometimes used to prove the diagnosis, as when iodide of potassium is given in cases of doubtful syphilis. Reasoning in the same way, Dr. Haig asserts that when any local irritation is not increased and made worse by acids given to the extent of distinctly raising the acidity of the urine and diminishing the alkalinity of the blood, or is not improved by alkalies given to the extent of decided diminution in the acidity of the urine or increase in the alkalinity of the blood, or by a salicylate given to the extent of producing a great increase in the excretion of uric acid, then such local irritation is not directly due to uric acid.

In the same manner I would venture the suggestion that when a case of apparent muscular rheumatism does not only yield but also does not stay improved after a few massages, then the probability is that the case is one of neuritis affecting the nerve-fibres that supply the impaired muscles. This probability would be strengthened when the pain is uniform, affecting the same muscles on both sides, when it is worse at night whilst the patient is at rest and warm in bed, and better when up, moving about, which calls into play the inhibitory action of the will; whereas muscular rheumatism is aggravated by motion and relieved by rest and warmth. The difference in favor of neuritis would be increased when the consistency of the affected muscles does not differ from that of the well muscles or is somewhat diminished. Of course, it is not a question here of marked cases of neuritis where the pain is confined to one or more nerves and their distributions, with atrophy of

muscles, altered electrical reaction, glossy skin, etc., but rather those of mild character and doubtful diagnosis.

The relief from discomfort and freedom of motion experienced after each massage in those cases which are too apt to be snappily diagnosed as muscular rheumatism, but most likely are neuritis, is so great that, though the temporary improvement may not be held, yet the patient is apt to demand that the massage be continued until the ultimate result, which, with appropriate internal medication, should be recovery. The following cases may be cited as examples:

Mr. D. was sixty-three years of age, and had always enjoyed good health, with the exception of frequent attacks of asthma. He was well nourished, having a due proportion of muscle and adipose. He came to me in July, 1887, suffering with stiffness and discomfort of the shoulders and hips of several weeks' duration. This first showed itself in the hips. By reason of this discomfort he was restless and uneasy at night. At first sight the trouble seemed to be entirely muscular, and this view was strengthened by the result of treatment, for he had massage and passive motion early every afternoon nine times in succession, and after each massage he could bend over freely and rise from a chair without the assistance of his arms, cross each leg over the other with ease, tie his shoes, and dress himself, even to putting on his coat, as if there were nothing the matter with his shoulders, all of which he could not do before massage. This improvement continued the remainder of the day, but, unfortunately, next morning he was almost as stiff as ever. Though his deltoids and glutei did not appear to be altered in consistency, after massage they were much suppler and afforded corresponding freedom of motion. Evidently this patient ought to have had massage twice a day, so that the effect of one *séance* would not have been gone before he had another; but instead of this there was an interval of ten days in which he had none and grew rapidly worse. Then he had massage every other day three times, with but slight temporary improvement after each time. After this he tried travelling three weeks, during which he was drowsy and depressed, and came back worse than when he went away, so that it was with great difficulty that he could raise either foot high enough to get into a carriage—indeed, he had to ask his coachman to help him raise the leg for this purpose, and it was hard work for him to get into his coat even with assistance. He stooped like an old man. Pains in

the fingers had also set in, so that it was difficult for him to hold a book. The muscles of the shoulders and upper arms and of the hips and thighs had become somewhat atrophied and flabby, with diminished reaction to both galvanic and faradic currents and increased irritability to percussion. Pressure on the large nerve-trunks and muscles showed no tenderness. He was about four months getting into this, his worst condition, in which he remained for three months, and he was five months, or the balance of the year, getting well. During this time, as if by way of compensation, his asthma scarcely troubled him. He continued to get about and attend to business even at his worst. He had electricity occasionally in the daytime, and massage almost every evening on retiring, which gave him much relief and comfort and aided him to sleep better. He is firmly of the opinion that massage aided his recovery and shortened his suffering by at least one year.

This case was undoubtedly one of neuritis, and what is of the greatest interest is the fact that just before his first symptoms appeared he had been taking five drops of Fowler's solution of arsenic three times daily for six weeks for his asthma. Five months later arsenic was found in the urine in large quantities by Professor E. S. Wood. During his recovery the patient, on his own responsibility, took a secret preparation containing arsenic and hydriodic acid for his asthma. The neuritis that was most likely left by the arsenic in the first instance was probably benefited by the arsenic in the secret preparation, and so thought an eminent neurologist under whose care he was for a while.

Another case presenting symptoms similar to the preceding was recently consigned to my care. For six months or more there had been pain and stiffness in the shoulders and upper arms, in the hips and thighs, worse in bed and while at rest, better when up and moving about. At my urgent request the urine was examined and found to contain large quantities of arsenic. Under a tonic, with massage and passive motion in the evening, he made a good recovery in a few weeks, much to our astonishment, as no other treatment was used. It is not likely that the arsenic was entirely eliminated by massage alone in such a short time, so it would seem that the patient got well in spite of this. It did not trouble him in the least to learn that his tissues contained much arsenic, for he had heard of the arsenic-eaters of Styria and Austria that they had

good appetites and good digestion, and were strong and well nourished. After all, perhaps arsenic has had more laid to its blame than it deserves. How much better arsenic may act while a patient is undergoing massage can only be conjectured. How much more quickly it may be eliminated while the patient is having massage is also a subject for consideration. Dr. G. Tedeschi * has reported a case of lead-poisoning cured by massage after the usual treatment had failed. By this means he found that the urine was increased in quantity and the lead eliminated more promptly than by any other means.

What is called rheumatism frequently affects both muscles and nerves. An acute case of rheumatic sciatica, intractable to the usual orthodox remedies, can sometimes be speedily changed for the better by means of massage, even when this does not afford such marked temporary relief as in such cases of neuritis as those just mentioned. In March, 1888, I was kindly asked by Dr. J. B. Ayer to visit his patient, Rev. B. H., fifty-eight years of age, who was well nourished, with tissues supple and elastic, except in the affected regions. He was then in his third attack of sciatica, or, more properly, rheumatic neuritis of the sciatic nerve, all three attacks having been traceable to his getting run down from overwork, and each attack having been preceded by lumbago, which faded away as the sciatica became more pronounced. The lumbago had affected the muscles on both sides; the sciatica, the right hip, thigh, and leg. The first attack had occurred eighteen years before and lasted for three months; the second came eight years later, and lasted for six months—worse than the preceding. The third attack had lasted severely for four weeks before I saw him, and, according to the same geometrical progression, we calculated and feared that he was in for a year of it, as antirheumatics, tonics, sedatives, galvanism, and faradism had produced no sensible amelioration. We were agreeably disappointed, for in four weeks and a half, under massage once a day most of this time, with morphine when the pain became intolerable, he was, to all intents and purposes, well. Afterwards whenever he felt any premonitions of a returning attack he had recourse to massage, a few applications of which has always afforded the desired relief. And this brings me to say that, when a patient

* Giornale interno delle Sci. Med.

has been benefited by massage, if a relapse or reappearance of the same trouble takes place, it is much more speedily relieved or cured by massage than it was at first; in other words, the patient has become more susceptible to its influence.

At the fifth visit massage was given to leg, thigh, and hip only, as the pain in the lumbar region had disappeared and suppleness of tissues had returned. The manner of using massage was by gentle stroking or *effleurage* on the posterior aspect of the limb, and deep, vigorous manipulation on the lateral and anterior aspects. Sometimes it is well to use deep pressure, so as to squeeze congestion out of a nerve, and then vigorous percussion over it, so as to produce an obtunding effect; but these were out of the question at first in this case. The sixth massage seemed to rouse a slumbering soreness and make the whole limb uncomfortable for an hour; but after this it felt better than before and continued so. Subsequent massages after this had a similar effect. The reason of this was, without doubt, due to the detaching of adhesions which caused matting of the tissues. This required arduous work, but as suppleness and elasticity returned the work became easier. At the twelfth visit, after forty minutes of massage to leg, thigh, and back, the patient felt that if I did any more it would certainly arouse the pain which the massage had just quieted. This was near the end of the third week, and he could run up and down stairs freely. And so the patient improved with interesting variations, pain decreasing and intervals of comfort increasing. On the thirty-first day after massage was begun he preached twice, superintended his Sunday-school (distributing presents to the children), and felt no worse for it. Sixteen massages in four weeks and a half, then a week's vacation, and he was himself again. But the external aspect of the leg, from the knee to the toes, has remained numb ever since.

Dr. A. Symons Eccles, in an article on "Massage, Rest, and Position in the Treatment of Sciatica," has reported several cases of sciatic neuritis in previously healthy people which he treated successfully in this manner after the failure of other means. The massage consisted of *effleurage,* kneading, and percussion, and, in the intervals, the leg was suspended in a Salter swing, as this was the only position that afforded rest.

Professor Max Schüller, of Berlin, is convinced of the superiority of massage over other means in the treatment of sciatica. He

relates his experience of fifteen cases which were dealt with from the first by massage. The neuralgic pains soon abated, becoming less even after a severe and painful massage, then recurring with less severity, and gradually disappearing altogether. The length of treatment required about eighteen days on an average for cure,* certainly a very short time for such severe cases.

Rev. E. B., an elderly gentleman, had been exposed to a draught of air on his back while sleeping in a steam-boat berth on the Pacific Ocean. This brought on severe lumbago. When I first saw him, three months afterwards, he complained of a constant dull, tired ache in the lumbar region, which made him prefer sitting to standing and lying down to sitting up. Sleep was disturbed by the backache. His muscles were of the kind that readily respond to massage, neither too hard nor too soft, nor deeply embedded in adipose. After twenty minutes of deep malaxation with percussion the patient enjoyed a good night's sleep, and next day stood up for three hours and wrote thirteen pages of a sermon. A few more applications of massage were given to confirm and improve on what had been done, and the patient made an excellent recovery.

In the case of a vigorous adult whose muscles were very firm and well covered with fat, who had suffered from myositis of the deep lumbar and abdominal muscles, for several weeks so severe as to confine him to bed, daily massage for four weeks did not have any effect that I could see, other than pleasing the patient very much. This gentleman, several years before, was greatly relieved of a more superficial rheumatism of the muscles and fascia of the back and hips by means of massage.

Mr. L., forty-one years of age, a vigorous lumberman from Minnesota, had suffered from muscular rheumatism for five years. At one time it had been very acute and general, so that, to use his own language, he was "as stiff as a post and as sore as a boil all over." When he came to me he had greatly improved, but seemed to have come to a stand-still with pain and stiffness still left in the lumbar muscles and also in those of the right hip and chest. Sneezing and coughing aggravated his pains. After half an hour of massage the patient declared that the right hip was free from restraint and felt as if lengthened two inches, and he could walk

* Deutsche medicinische Wochenschrift.

with greater ease. He had three more massages with marked improvement in the comfort and elasticity of his muscles.

Norström narrates the following interesting case of myositis involving the trapezius and scaleni muscles with indurations, accompanied by habitual headache and reflex migraine, cured by massage: Mme. M., twenty-eight years of age, had suffered for several years from vague rheumatic pains which ended by concentrating themselves in the head. Galvanization and faradization, quinine, caffeine, and aconitia had been tried, besides hydrotherapy and a season at Aix-les-Bains, with but temporary relief. The pain was rather dull than acute, and situated in the upper regions of the face, and often sufficiently intense to wake the patient early in the morning, and then no better means of relief were found than for her to keep quiet in bed all day. Her head often felt as if it were inclosed by a vice, the right eye red and tears flowing, and at times there were nausea and vomiting and sometimes spasmodic contractions of the muscles of the face resembling tic douloureux. The paroxysms had increased in frequency and intensity. Intellectual efforts or sad impressions were sufficient to provoke the attacks. Her disposition was changed and she sought solitude. She had become anæmic and believed herself incurable, and had scarcely any faith in massage.

Examination showed that the scaleni muscles and the acromial part of the trapezius of the right side were unnaturally hard and resistant to pressure, and several indurations of the size of a hazelnut affected the muscles throughout their depth. The largest was at the upper part of the trapezius, pressure upon which caused more acute sensation than anywhere else and radiated to the right side of the face, giving rise to pain analogous to that which was felt at the time of an attack. At first massage was very painful over these indurations, but at the end of three or four weeks it was more endurable. As these callosities disappeared under massage the headache decreased. In five weeks the paroxysms were less frequent, but it was only at the end of four months, after eighty-two *séances,* that the patient was well, sleeping tranquilly, looking cheerful, and in good condition. The muscles had resumed their former volume and there were only traces left of the largest indurations. Several months afterwards there was no relapse.

Of forty-nine cases in which the situation of indurations was

noted, associated with migraine, Norström found fourteen at the upper attachments of the muscles of the back of the neck, in nineteen they were found in the bodies and at the inferior attachments of these muscles, in nine in the muscles of the sides and front of the neck, in two in the subcutaneous tissue of the head, in three in the temporal region, and two involved the ganglia of the sympathetic. The majority of these cases were cured, and in all but one marked improvement resulted under massage.

Besides these, many other cases of muscular rheumatism or myositis cured by massage are published by Professor Gussenbauer, Mezger, Wretlind, Berglind, and others.

XVIII.

Muscular Rupture, Elephantiasis, Oedema.

Muscular Rupture.—Slight rupture of muscular fibres and the resulting myositis can be treated advantageously by massage and bandaging. Indeed, these measures have now become classical in the treatment of so-called dislocation of muscles and are recommended in works on surgery by Bryant and others. But it is very seldom that massage is used in these cases, and superficial friction with liniments has to take the name and the place of it. In 1879 I attended Mr. J. C., forty-five years of age, a large, stout man in good health. Four weeks before I saw him he stepped from a horse-car before it had stopped and immediately felt something give way in his left calf, which was accompanied and followed by stinging pain. He continued to walk about for two weeks, during which the limb grew worse, and he was finally obliged to resort to crutches, without allowing his foot to touch the floor. At the junction of the lower and middle third of the leg, on the inner aspect, there was a depression of the skin which, with the muscular tissue beneath, had a hardened, cicatricial feeling, and the whole of the inner belly of the gastrocnemius was rigid, indurated, and painful. The limb could not be fully extended on account of painful stretching of the tendons of origin of the gastrocnemii. Extension could be slowly made to about four-fifths normal. The limb had been showered with cold water and improperly bandaged. Massage was painful at the first application, but at the second the limb was greatly comforted, and immediately after the patient could extend it himself without discomfort. In correspondence with this the rigid, swollen inner belly of the gastrocnemius had become more supple and less sensitive and œdema had disappeared. Resistive motion was then begun and well executed. At the end of two weeks he could walk very comfortably without support after six massages and while constantly wearing a uniformly applied bandage. In seven days more he could go up and down stairs. In twenty-four days he was getting well too fast, as was shown by his having overwalked and relapsed slightly with the former symptoms, but these

were very promptly relieved by massage and the reapplication of the bandage. Seventeen days later all disagreeable symptoms had vanished, and the leg has been well ever since, now five years, and there has been unusual freedom from the aching, stiff feelings that generally linger a long time in these cases.

My friend, Dr. George J. Bull, kindly reported to me the following case of rupture of the anterior fibres of the trapezius from reflex action in the effort of the patient to save herself from falling: Mrs. C., forty-five years of age, a robust and muscular American lady, weighing one hundred and sixty-five pounds, fell heavily on a slippery sidewalk on March 13, 1875. She did not bruise any particular part of her body, but made a violent effort to save herself and was badly shaken. Her menses came on prematurely on that day,* but no other inconvenience was complained of except a feeling as if she had taken cold in the neck. Next day there was decided pain in the neck and shoulder, which was not relieved by the usual household liniments, but grew steadily worse until I saw her on March 17, four days after the fall. I found her carefully supporting the left elbow and hand and inclining her head to the left side. When perfectly still she felt only a dull ache, but the slightest movement of the head or arm caused her to cry out with pain in the left shoulder, neck, and back of the head. The pain was distinctly cramp-like and more severe than anything she had ever suffered, even in childbirth. The skin was not at all bruised, nor was there any sign of injury in the shoulder-joint. There was only great tenderness above the scapula, covering an area as large as one's hand. After half an hour's massage of the muscles of the neck and shoulder the tenderness was found to be confined to a spot on the side of the neck, a couple of inches above the scapula, where the slightest pressure caused acute pain and spasmodic contraction of the anterior fibres of the trapezius, running up to the occiput. Light rubbing was soon tolerated over the spot, and the pain no longer radiated to the occiput and shoulder. Before leaving I was able to move the arm freely in all directions without causing pain, and the patient could move her arm and head a little, while my hand supported the trapezius, without the spasm coming on.

* A patient of mine, forty-two years of age, convalescing from rheumatism, fell heavily on her nates, and the menses, which had been absent for three months, came on again.

The improvement continued, and the patient was tolerably comfortable lying on her right side. The spasm occurred occasionally in the night, and half a dozen times next day. There was thought to be a slight depression at the seat of the pain and a swelling behind it. On the eighteenth, after massage, the head could be raised and nodded and moved to the right without spasm, but any attempt to move it to the left was followed by spasm and could not be persevered in. Massage was used by me for several days; voluntary motion of the trapezius was encouraged, and on March 31 all symptoms had disappeared. At present, August 14, 1875, if the lady sweeps much or takes cold, she has some pain in the old spot, but rest soon relieves it. The doctor has added: "I have not given my notes in full, as they contain little else of interest; but I have said enough to show how a lady, not in the least nervous or hysterical, was relieved by massage of a very severe pain, and restored to a healthy condition more speedily than could have been accomplished by any other therapeutic means."

Of thirty-three cases of myositis of spontaneous and traumatic origin, treated mainly with massage by Johnson (*loc. cit.*), eighteen recovered, fourteen improved, and one was without result.

After complete rupture of muscles or tendons, massage and movements will often be able to educate the remaining well muscles to supplement the loss of the injured one, as the following case would seem to show:

Mr. J. was a moderately corpulent, hale, and hearty old gentleman, about seventy years of age. Nearly three years after rupturing the tendon of his left rectus femoris he called to see me, and I gathered from him the following history relative to his case: In getting off a horse-car, thinking it had stopped when it had not, he fell down, and, as it was with difficulty he could stand when he got up, he was taken home in a carriage. The tissues above and around the left knee-joint were swollen and ecchymosed. As he bore with impatience the restraint of rest which his physician put him under, at the end of a week he attempted to walk, but falling down two or three times somewhat deterred him from further attempts at this means of locomotion. Immediately following this came a *merciful*(?) illness of gastric origin which kept him in bed for a couple of weeks. At the end of this time the extravasation had been absorbed, leaving a depression above the patella into which two fingers could

be placed. Since then he had only been able to walk short distances, two or three squares or so, very awkwardly, and with his mind concentrated on the lame leg, for when he was off guard, which was quite frequently, he would fall.

About this time he consulted me, and after three applications of massage he walked from his house around the Common and Public Garden—about a mile and a half. The following week he had three more *séances,* when he again tried his pedestrian powers more than his business gave him any occasion to do, and this time extended his walk considerably beyond that of the previous week, "with greater ease and comfort," he said, "than he ever believed he would, and without scarcely thinking of the lame leg." After three more massages he went out of town to look at a country residence for the summer, and, being seated in a rear car, he thought they had not quite reached the depot he wished to get out at. But when they started he discovered his mistake and pulled the bell-rope, got out when the cars stopped, and walked back to the depot on the track, a distance of over a mile. The carriage he had engaged was by that time gone and none could be had, for it was only a small country station. So off he started on foot, and walked from and to the depot, over a hilly country, in all about five or six miles, enough to tire almost anyone, he thought, and yet the lame leg felt no worse than the other next day. He continued to have such good use of the limb without any more trouble for four months longer, when he was taken with a severe illness, which kept him prostrate for a long time.

The treatment was friction and kneading of the whole limb with the palm and fingers, varied with acto-passive or resistive movements of the foot, leg, and thigh in all their natural directions. While using the acto-passive motion, it was interesting to observe from time to time the increasing strength and ease of movement which he was gaining. That such treatment often improves the nutrition and contractility, extensibility, and comfort of muscles, and consequently makes them more ready to obey the mandates of the will or the automatic action of its subordinate centres, has been recognized from the most ancient times.

DUPUYTREN'S FINGER CONTRACTION, consisting of hyperplasia and induration of the palmar fascia, the result of slight or severe injury and reflex nervous irritation, has been successfully treated

by means of massage. At the meeting of the New York Academy of Medicine, held April 17, 1884, Dr. Sayre said that by this means alone he had secured excellent results in two cases without resorting to any operative procedure whatever. On account of the atrophic condition of the areolar tissue he believed that massage and similar manipulations were of much service in this affection. Von Mosengeil narrates the case of a violinist who contracted the affection in consequence of an injury to the palm of his hand by a fiddle-peg. The ring-finger was particularly affected.* During the massage the contracted fingers were extended. In this manner the trouble was completely and permanently removed. Drs. Bradford and Lovett in their edition of "Orthopædic Surgery" of 1890 said: "Massage has proved useless and extension of the diseased fingers by manipulation or by means of apparatus has never yielded permanent results." We do not find any such statements as this in their later edition, from which we infer they do not consider massage and extension so useless as they formerly did.

ELEPHANTIASIS.—In 1874 the venerable Dr. Henry I. Bowditch sent me a well-marked case of elephantiasis in a girl of fourteen years of age. She looked pale and delicate, but enjoyed good health, notwithstanding the fact that the affected leg, from the toes to the hip, had the appearance of belonging to a Cardiff giant, and certainly represented at least one-half of her total weight. Half an hour of arduous, deep massage caused a decrease in the circumference of the calf of half an inch at a definite point. I never saw nor heard from the patient again. She had been to an irregular practitioner one hundred times for electricity under promise of being cured, and it is quite likely that her parents took her back to him.

I was more successful with my next case, which was sent to me by the late Dr. George H. Gay in November, 1877. The patient, sixty-nine years of age, presented the symptoms of elephantiasis, but was otherwise well. The history of his trouble began four months before he came to me by his being seized with sudden and severe pain in the middle of the lower part of his back, accompanied by chills, while he was at the water-closet in undress,

* In eighty-eight cases out of one hundred and five Dr. Keen found the ring-finger affected.

having gone there soon after being circumcised. He could not get back to bed without assistance. In the course of an hour the pain extended to the left hip and down the left leg, and soon the leg became swollen. For three months and a half afterwards there was loss of power in defecation, but the bladder was normal. When I first saw him the leg, from the toes to the knee, was of a dusky, bilious color, looked like a side of bacon, and felt almost as hard as a board, so that it was with difficulty finger pressure would leave an indentation. The skin, superficial fascia, and connective tissue were hypertrophied and indurated, with here and there on the surface patches of eczema. To the patient the leg felt numb, as might have been expected from so much pressure upon sensitive nerves. He could walk a short distance naturally. The calf at its greatest circumference was two and three-quarters inches larger than the other. Daily at first, and every other day afterwards, I used showering, alternately with hot and cold water, and this was followed by deep, firm, upward kneading, which was begun at the uppermost part of the infiltration and gradually proceeded with downward; and the decrease in circumference obtained in this manner was held and continued by two or three layers of tightly applied bandages and instruction to keep the limb elevated. In four days the calf had decreased one and three-eighths inches in circumference, the leg was supple and more comfortable, the capillary circulation was better, and the patient could walk easier. At the end of twenty-two days there was very little of the bacon, board-like condition left, and massage made greater impression, twenty minutes of it causing a temporary decrease of one-quarter of an inch in circumference, whereas at first but one-eighth of an inch was gained; and the total diminution was two and nine-sixteenths inches, three-sixteenths of an inch more than the other calf. The patient had twenty sittings in five weeks, at the end of which the calf was the same size as the well one, the skin could be pinched up in natural folds, but the ankle was still somewhat larger and harder than the other. He was then discharged, with an elastic stocking, and advised to continue the showering and keep the limb elevated as much as possible. A month later his exercise consisted in a daily three-mile walk, and that without discomfort. Six months later he had laid aside his elastic stocking, and the leg continued well.

The day on which I finished treatment of the above case I found

in Schmidt's *Jahrbücher,* No. 1, Bd. 173, 1877, a brief account of two cases of elephantiasis treated by manipulation and bandages by Professor Von Mosengeil, of Bonn. In one both legs were affected from the toes to the knees. At first massage alone was used with considerable improvement; then firm compression by means of roller bandages was added. After five or six weeks the patient could walk better, and the skin was thinner and more movable. The other case was less severely affected, and greater improvement resulted.

When œdema is dependent upon diseases of the heart, liver, or kidneys, or an altered condition of the blood, massage will not act in a curative manner, though temporary alleviation may be gained. But œdema continuing when the cause has been removed is generally speedily absorbed under the impetus of massage upon the lymphatics and capillaries. In recent thrombosis massage might be dangerous and convert the case into one of embolism. Sir W. Fergusson adopted this plan with advantage in two cases of aneurism of the right subclavian artery. He first emptied the sac by pressure with his thumb, then squeezed and rubbed the opposing surfaces against each other, so as to force the fibrin into the artery. The effect was immediate and striking. In the first case there was giddiness, in the second partial hemiplegia, so that in all probability some of the fibrin had been carried into the vessels of the brain. In the first, after one or two repetitions of the manipulation, all circulation in the vessel and its branches was arrested and the aneurism became smaller and firmer. After unusual exertion it burst into the brachial plexus, and the patient died seven months after the first manipulation. In the other case the tumor became gradually less, and the patient was alive and well two years afterwards. (Druitt.) By the same procedure Herbert Page, of Carlisle, also treated successfully a case of popliteal aneurism.

The œdema and superabundance of callus sometimes met with after the union of fractures can both be lessened or removed by the use of massage, at the same time that the circulation is increased and the muscles restored to activity. Passive and active movements should also be encouraged.

In a case of myxœdema of four years' duration occurring in a man fifty-six years of age, who was sent to me by Professor R. T. Edes, the result of a course of massage every other day for six

weeks was most satisfactory. The boggy, brawny, waxy condition of the tissues gave place to suppleness, freedom of motion, improved mental tone, and better hearing. Four years have elapsed and the improvement has continued. The man is practically well and attends to his business.

Since then several cases have been reported as much improved or cured by means of massage and hypodermic injections of an extract of the thyroid gland of a sheep. A most interesting case of this kind has recently been published in the *British Medical Journal* by Dr. Wallace Beatty. The patient, a lady, forty-five years of age, had for five or six years become more and more easily tired; speech had become slow, memory impaired, temper irritable, walking difficult, constipation increased, and susceptibility to cold greater. Her face was swollen, waxy-looking, and anæmic, lips and ala nasi thickened, nose broadened, and hair thin; hands and feet, arms and legs, more enlarged and clumsy. No trace of the thyroid gland could be made out. Examination of the blood showed the hæmoglobin to be seventy per cent. of the normal.

Five weeks of massage brought some improvement, and then hypodermic injections of an extract of sheep's thyroid gland were also used and more rapid improvement followed. The patient was under this treatment for twelve weeks, continually improving. After treatment was discontinued she steadily progressed, so that she was practically cured: the face looked natural; the skin of the face was no longer swollen; the lips were natural and the tongue of natural size; the speech rapid and easy; the hands no longer clumsy; her finger-rings loose and easily movable; her movements active; her hair, which had been thin, had grown thickly; her memory returned, and menstruation had become natural.

XIX.

Lateral Curvature of the Spine, Rickets, Weak Foot, Anterior Metatarsalgia.

"We'll come dress you straight."—*Merry Wives of Windsor.*

DICKENS somewhere in one of his novels tells of an old graveyard near London where the headstones all leaned forward as if ashamed of the lies they told. The erect position is that of faith, hope, and courage, of spiritual, mental, and physical strength; while the opposite, or bent-forward, is that of fear, care, and anxiety; of worry, despondency, and weakness. The maidens of Capri carry heavy weights upon their heads and are remarkable for their faultless development. In Swabia women and girls carry heavy loads upon their heads up high mountains, but in spite of this, or perhaps in consequence of it, lateral curvature of the spine amongst the laboring classes is seldom met with. On the contrary, very prettily formed figures are almost exclusively found, due no doubt in great part to this exercise in the open air. Here we have the keynote to the treatment of scoliosis.

It is generally conceded that the most usual cause of lateral curvature is due to the superincumbent weight of the upper part of the body pressing obliquely upon the spinal column below when it is inclined forward, and pushing the vertebræ and cartilages, ligaments and muscles, in wrong directions. The muscles themselves, if not the primary cause of the disturbance, soon behave in an irregular manner, becoming contracted and shortened on one side, relaxed and elongated on the other. Predisposing causes that weaken the tissues are lazy and luxurious habits of lying too long in bed on one side with high pillows under the head, improper nourishment, and want of fresh air and exercise. Incipient scoliosis is sometimes indicated by exceeding flexibility of the spinal column combined with flat back. Autopsies of advanced cases where bones, ligaments, and muscles have been in an uncorrectable position for a long time are rare, for it is not a fatal disorder. Landerer, of Stuttgart, and Phelps, of New York, have both found atrophy and fatty degeneration of the muscles on each side of the

spinal column. On the convex side it seemed to be due to the pressure and stretching of the muscles by the bending of the bones; on the concave, to the contraction of the muscles and their long disuse.

Indications for treatment are, first, to get the spinal column freely movable in all directions, if it is not already too much so, and for this purpose passive motion and massage are evidently of the utmost importance. When it is freely movable, passive movements may be omitted, except such as may be necessary to correct the deformity, and active or unaided and resistive movements employed with, if possible, massage before to invigorate the muscles and afterwards to rest and refresh them. All the movements—passive, active, and resistive, as well as assistive when the muscles are very weak—should be planned with a view to overcoming the deformity, which is not always an easy matter. In the present state of our knowledge experience is perhaps the best guide, for satisfactory theories of the production of lateral curvature have not yet been fully agreed upon. Faulty habits of sitting, lying, and standing should be corrected and the patient made to sit, lie, and stand in ways opposite to those which favor the curves. Plaster jackets, corsets, and supports, though fulfilling valuable purposes, should be laid aside as soon as patients can hold themselves as well and as long without as with them. When in use they should frequently be removed and the patient bathed, *masséed,* and exercised short of fatigue, for the curves are always worse when the patients are excessively tired. The three principal manœuvres of massage — stroking, deep manipulation, and percussion — are of value, the most important being the deep manipulation, graduated to suit the patient and proceeding from the insertion to the origin of the erectors of the spine, from the upper to the lower part of the back. During this the patient should be placed in a position opposite to that which favors the deformity, removing or using hard pillows for this purpose, pushing down prominences and raising depressions as much as possible by manual force. Upon muscles that are relaxed massage stimulates contractility, and upon muscles that are in a state of contraction massage favors relaxation. Alternating with the massage the patient should turn occasionally upon the back and the arm corresponding to the contracted side, and the depressed shoulder should be vigorously pulled up a few times, and

after this the patient can pull the same arm down against the resistance of the manipulator times enough until fatigue seems to be approaching. A contracted muscle pulling against resistance extends more than it does when relaxed with the same resistance attached to it. Pulling both arms simultaneously down to the sides against resistance is a good general exercise. With the patient prone and a pillow under the abdomen the ribs and spine are sufficiently raised to form a good substratum against which to do massage on both sides of the spine separately or simultaneously.

For the more effectual stretching of shortened tissues on the concave side of the spine, suspension by means of a sling around the chin and occiput, with a rope proceeding therefrom through a pulley overhead, is an excellent procedure. This is usually called Sayre's apparatus, but Professor Sayre gave full credit to Dr. Benjamin Lee, of Philadelphia, for the first use of this, and for its invention to Mr. Reynders, of New York. In 1650 Glisson put into practice extension in the vertical position by means of an apparatus which suspended the patient by the head, the arms, and the hands, and called it the "English Swing." * The hand on the side of the lower shoulder should always seize the rope above the other, and when patients are well enough to pull themselves up in this way (autosuspension) the hands of the surgeon or manipulator are free to compress and push down prominences by steady pressure or by thrusts. Still better, however, while the patient is suspended by the head, is to have a sling envelop his body and a rope proceeding from this to a pulley in the wall by which he can be pulled by an assistant and swung sideways with the pressure against the convexity. This is most admirably done at the Children's Hospital in Boston. It does one good to see how these little patients enjoy this most salutary and corrective exercise, for the higher and longer the swing the better they like it, and they go at a great rate. Forcible correction of convexities and prominences by means of padded levers must be very helpful, but it seems to me that this is such a powerful procedure that it ought either to be done by the surgeon himself or under his immediate supervision. There are many excellent devices for bending the spinal column in an opposite direction to that of the deformity, such as that of Lorenz, where the

* Dr. Georges Berne, Le Massage, p. 298, Paris, 1894.

patient's own weight is made to do good service. But I fear there are very few who fully realize how much more easily and comfortably the tissues of the patient would yield if they could have massage before, and how much lighter and suppler they would feel by a few minutes of massage after the stretching. Before attempting forcible correction of deformity by means of Hoffa's apparatus as modified by Bradford and Brackett a course of massage and passive motion extending over weeks or months would certainly facilitate matters.

Resistive movements while the patient sits or stands can often be employed with advantage. For this purpose one of the very best places to make resistance to strengthen either neck or back muscles is the occiput. At the commencement of this push, when properly done, a certain amount of extension is also gained. Resistance to extension of the trunk can be well done with one hand on the posterior dorsal prominence and the other on the lumbar projection or chest, and while the patient bends back the surgeon or *masseur* can give a thrusting motion in a direction opposite to that of the deformity. For special exercise of the extensors of the back the patient can be placed upon a table so as to rest on the anterior aspects of the thighs and legs and held near the heels by an assistant or straps, while the body projects beyond the edge. Then the patient can elevate the trunk upward and backward as far as possible. At the beginning of this exercise the patient will sometimes have to be assisted, but later the strength acquired by this exercise will often be much greater than that of well backs without similar training. There are many other excellent devices for strengthening weak and erratic muscles while correcting abnormal spinal curves, but these are some of the most important.

Patients can often do a great deal to aid themselves at home. Lying down occasionally during the day, with or without a pillow under the greater projection, is of value to afford rest, to lessen the superincumbent weight, and to act as a mild corrective. A more vigorous and often more valuable exercise is to sit on an inclined plane with the higher shoulder towards the higher end, so that the patient must bend in the latter direction, and make a constant effort to keep from sliding off. The patient can often place one hand against the side of the convexity, the other on top or back of the head, and bend towards the convex side a number of times.

He or she can walk with a weight on the depressed shoulder, so that it will have to be raised to support it, and later, when stronger, on the head. The arm of the side that corresponds to the convex dorsal curve can be placed across the front of the chest in an upward direction, so as to relax the serratus magnus and rhomboidei muscles, whilst the arm of the opposite side is placed downward across the back, so as to make the same muscles tense, and the patient should be instructed to breathe deeply. This is a valuable exercise and helps to unscrew the rotation while the spine is still flexible and not fixed. Other muscles, however, cannot be isolated in this position, for the lower half of the trapezius and the latissimus dorsi will at the same time contract and pull the spine to this side, whilst the relaxation of the same muscles on the other side will allow this twist to be all the more easily accomplished, and in the erect position the general effect in some cases would be salutary, in others not. Still more, the upper half of the trapezius on the side of the muscular contraction will be strongly pulled downward and to the same side, thus helping to efface a dorsal convexity to the other when it exists.

But the mechanics of lateral curvature of the spine are not by any means so simple as we wish they were. It is a study that still engages the attention of our best orthopædic surgeons, and until it is more definitely settled the effects of positions and exercises had better be carefully watched, and their results will indicate how they should be varied. In order to elucidate this problem Dr. R. W. Lovett, of Boston, has madé some very interesting and painstaking observations on the living and dead subject.* He found that when a healthy spinal column was bent forward and flexed to one side the bodies of the vertebræ rotated towards the convexity and the spinous processes towards the concavity. When the spine was overextended or bent backward and then flexed to the same side as before the rotation of the vertebræ was just the opposite, the bodies were towards the concavity and the spinous processes towards the convexity. The inference from this would seem so clear as not to require mentioning. But the wise observer of his own experiments does not jump at the conclusion that almost forces itself upon the reader of them,—that extending the spine back and then bend-

* Boston Medical and Surgical Journal, June 14, 1900.

ing to the same side as that of which flexion favors the deformity would be the best corrective measure for lateral curvature of flexible spines. He is careful to advise side bendings in the extended position as good exercises, not to the side alone already bent, as his experiments would seem to indicate. This is an instance of common-sense being preferred to the teachings of science, for we certainly do not want to encourage a spine to always bend to the same side whether flexed or extended. Science often follows art with limping strides, as has been said before, and in these instructive experiments an explanation is found of the beneficial effects of the calisthenics and gymnastics in the erect position as advocated by Dr. Teschner and modified after those of Attila, a trainer of strong men. This system consists of a series of exercises with light dumb-bells followed by exercises with heavy dumb-bells and steel bars. They are done alike with each side, sometimes alternately, sometimes simultaneously, as they are designed to cultivate the strength and equipoise of the whole body. We should think that one side might sometimes have different exercises from the other, and that more exercises of bending backward would be advisable. But concerning this matter Dr. Royal Whitman in his recent excellent "Treatise on Orthopædic Surgery" says: "Any treatment that makes the spine more flexible, that overcomes faulty attitudes, and that strengthens the muscles must be of benefit to the patient, the degree of benefit corresponding to the persistence and energy of the pupil and the instructor, *rather than to any particular theory on which such treatment is based.*"

Much diversity of opinion prevails as to the possibility of benefiting or changing fixed curves of the spine in adults. That such curves may be caused by occupation in the adult certainly offers the suggestion that they may be changed for the better by exercises and positions the opposite of those that brought them on. Bradford and Lovett have proved by clinical experiences as well as by experiments on the cadaver that pressure on different parts of the thorax is effectual in correcting rotary lateral curvature of the spine; but in certain cases the curves are too resistant to be altered by intermittent pressure, and then, if the patient is still growing, attempts should be made to correct the curves by constant pressure with plaster jackets, etc. Lovett has recently pointed out that forcible attempts to correct bony rotation in fixed curves will in-

crease the lateral curve unless the thorax is kept from rotating.* When it is quite evident that the spinal curves are irretrievably fixed, that the bones, cartilages, and ligaments are permanently changed in shape, then the painful tension of the muscles and the intercostal neuralgia that are so often present can be greatly relieved by means of massage, and the patient made comfortable for a long time after the discontinuance of this treatment. The same result may be accomplished in other ways,—by suspension, recumbency, and electricity,—but not so agreeably or quickly alone as with massage.

Alice M., thirteen years of age and seventy-two pounds in weight, small in stature for her age, was somewhat anæmic, but bright and intelligent. She had slight convex curvature of the spine to the left in the lumbar region, which was increased when she bent forward, and when she extended backward she felt pain in this region. The lumbar and erector-spinæ mass of muscles were enlarged, tender, and indurated. Lying on the right side with her head moderately elevated effaced the lumbar curve. A few weeks before this she complained of her back hurting her at school, which she was attending five hours daily. I advised but three hours of school and one hour of repose on her right side after lunch, suspension by the hands several times daily from a horizontal bar, massage three times weekly, and a ferruginous tonic inside. Under this combination of treatment she was much better in two weeks, and at the end of three weeks, after ten massages, she had no more feelings of fatigue or discomfort, and the muscles of her back were supple and elastic and not at all sensitive to pressure. Neither was any tenderness elicited by pressure on the spinous processes of the lumbar vertebræ, which had been very marked but three weeks before. A month later she called to see me, looking and feeling well. She was then going to school all day with a superabundance of energy. Her mother said she must have grown rapidly within the previous two months, judging from the way she had to let her old dresses out and have new ones made. She had similar symptoms eighteen months before and got over them by the same plan of treatment, though they were not followed at that time by rapid growth. It is seldom that one gets a case so favorable and results so good in

* Boston Medical and Surgical Journal, October 31, 1901.

such a short time. It usually takes months to benefit scoliosis unless it is taken in hand at the very start. Induration, thickening, and tenderness of muscles, not connected with disease of bones, are always favorable indications for the employment of massage.

When Mr. P. came to me in May, 1891, he was forty-four years of age and weighed one hundred and eighteen pounds, which was ten pounds more than his usual weight. He was kindly referred to me by Dr. J. P. Oliver, under whose care he had been for the previous six months for indigestion, and he had improved much in this respect. Three years before this he had had pleurisy in the left chest, from which he recovered, and there was no evidence of effusion remaining at the time he came to me. For a much longer period, many years, he had known that his left chest was prominent anteriorly, but he did not know that this was associated with curvature of the spine until Dr. Oliver told him. It was impossible to learn whether the pleurisy had aggravated the bulge of the chest and the curvature of the spine or not. It had certainly not improved them. The spine had three curves,—one to the left, in the upper dorsal region, the greatest to the right of the middle and lower dorsal vertebræ, and the other to the left in the lumbar region. The extreme point of the convexity of the curve of the middle dorsal region deviated an inch and a quarter from a chord formed by the extremities of this curve. There was evidently much rotation of the vertebræ. The left shoulder was slightly lower than the right. Placing the right hand upon the upper and front of the left chest and the left behind the back, or *vice versa*, had no effect upon the curves, neither did bending forward. They seemed surely fixed. But, nevertheless, they lessened somewhat when the patient was placed on the left side with a high pillow under his head, and also when he was placed on the right side with a firm pillow under the greatest convexity and backward bulge of the chest. He was at once told to sleep in the former position, and to lie in the latter for thirty or forty minutes after his midday meal. He was on his feet all day as a dry-goods merchant and could walk five or six miles, but standing still for ten minutes caused his back to ache and made him feel generally tired. There was no spinal irritation nor painful places in his back. I gave this patient massage and faradization with such passive and active stretchings and pullings as are indicated above. After the first and subsequent

times he fell sound asleep for half an hour in the steam-cars on the way home, not even waking up at a very noisy station at which they stopped. He was not a drinking man. He came to me twice a week for five weeks, then once a week for six weeks. After the first two visits he felt no more weakness nor ache in his back nor general fatigue from his ordinary duties, and after the first three weeks the muscles of his back were firmer, plumper, and stronger, and his general appearance was much better. Careful measurements showed that the greatest convexity in the middle of the back had slightly decreased, but it is scarcely possible that there was any improvement in the rotation of the vertebræ. What odds if not, so long as the back felt strong and comfortable and the patient could attend to his duties all day long—eight or nine hours—without fatigue?

About five years afterwards this patient came to me again. His back had given him no trouble all this time until about a fortnight before he returned to me. He had had the grip the preceding two winters and lost some weight, but fully recovered. This time he complained of pain in the right lumbar region and in the left side, and inability to lie on the left side, as this position increased his discomfort. He thought his right chest projected more on its posterior aspect, and inspection proved that he was correct. On careful inquiry I learned that he had long ago neglected his home exercises and positions and that he had been bowling twice a week the preceding winter and was still doing so. He was at once told to stop bowling or else do this with his left hand. A much shorter repetition of the treatment that he had had five years before put him in his ordinary state of health and improved the curves. In two weeks he could lie with comfort on his left side. So much for a case with fixed curves where we cannot expect to do more than make the patient comfortable and improve the strength.

The results obtained from the employment of massage, positions, and exercises in carefully selected cases of lateral curvature of the spine by Dr. Landerer, of Stuttgart, have led him to become a firm believer in this method of treatment. His elaborate article on this subject before the Congress of the German Society of Surgery * is worthy of more attention than it can receive here. He considers

* Deutsche Zeitschrift für Chirurgie, Band XXIII., Heft 5 und 6.

that in health the antagonistic muscles keep the vertebræ at proper distances from each other. If there be muscular weakness, the vertebræ will sink down upon one another, and in sitting or standing, if the muscles act obliquely the spinal column will deviate from its natural position and the vertebræ will be pressed together in wrong directions, causing disturbances of their circulation and nutrition. Habitual scoliosis would seem to him to arise from superincumbent weight, the original cause of which was weakness of the muscles, and therefore the treatment should be directed to them.

He found that massage went farther than gymnastics, and what these accomplished slowly, massage did much more quickly in a direct manner by the hands of the surgeon. Cases of scoliosis in the first stage permanently improved in a few months. The children felt stronger and steadier in the back, and held themselves more erectly, even after a few *séances*. Though the immediate effect of the massage was quite evident, part of the improvement disappeared in a short time, but there was a balance of gain which gradually increased and became lasting. He usually treats his cases once a day, and in difficult cases, where a speedy result is desired, twice a day. Details of eighteen cases are given. Seven of these he places but little importance upon, as they were mild and probably would have recovered, though not so soon, under the usual orthopædic exercises. But it was quite otherwise with five of the cases which were much worse. In these treatment was begun without any hope of improvement and only at the request of the parents. In from twelve days to five weeks there was marked improvement, they were soon able to do without their supports, the deviation in the spinal column decreased, the shoulders became more horizontal, and pain and tension disappeared. Of the remaining six cases four were improved and two got well. At the time of writing several were under treatment, so that the results may be still more favorable. At a time of life when the skeleton was so consolidated as it was in the case of an eighteen-year-old girl it was not thought possible to produce any remodelling, but after two months' treatment it was hardly possible to perceive any deformity. Landerer finds an analogy to this last case in several of severe so-called inflammatory flat-foot or *tarsalgia adolescentium,* in which he succeeded in obtaining "perfect reformation" of the foot by

means of massage of the plantar surface and of the leg, even at twenty years of age.

We think that another analogy can be found in the relief that massage affords in cases of rheumatic gout. It relieves the tenseness of the soft tissues and makes them more supple, so that they adapt themselves much easier to the fixed nodosities.

Supports and corsets should be used for alleviating advanced scoliosis; but when there is any prospect of improvement these are contra-indicated, for the little work that the muscles of the back may be capable of performing is taken away by supports and atrophy speedily results, so that the muscles can no longer be used. After two or three massages Landerer found that most of his patients could do without supports and rejoiced once more in free and lively motion.

In the discussion which followed the reading of Dr. Landerer's paper Dr. Volkmann deprecated the wearing of a plaster jacket or felt corset by day and night. He has the corset removed at night, and in the morning the patient is bathed, douched, and *masséed,* and practises movements, as advised by Sayre, and about eleven o'clock the corset is again applied.

Dr. Loebker stated that he believed in the energetic treatment by means of massage of those muscles which contribute to the support of the spinal column. He does not apply any supports, and improvement takes place from the time these are laid aside.

Dr. König, of Göttingen, said that Landerer's method was in advance of that hitherto employed by him; yet he would not renounce altogether the corset treatment in favor of massage. He would limit the use of the corset to school-time. Experience had taught him that the complete removal of the corset all at once hinders improvement.

Dr. Kölliker, of Wurzburg, remarked that the most essential difference between Landerer's treatment of scoliosis from that hitherto employed consisted in energetic percussion of the muscles. He mentioned a very severe case of scoliosis with three curves which he had treated daily for three months by means of massage and percussion for several minutes night and morning, and thereby obtained a brilliant result never before equalled in his experience. With scoliosis of the second degree the corset should be applied in the intervals between massage.

Rickets.—However authorities may differ as to the value of massage in some affections, they all seem to agree as to its great importance in cases of rickets. This is a constitutional disease of infancy and childhood, the results of malnutrition; and whether the distortion of the bones affects the spine or not there is no difference of opinion as to the necessity of the daily use of careful massage.

The fact that it occurs not only amongst the children of the poor, who are ill fed and poorly clothed and suffer for want of pure air and sunlight, but also sometimes amongst the little ones of the more fortunate, who are well cared for in every respect, shows that something more is necessary than the correction of bad hygienic conditions. This has been found in massage as a mechanical stimulant to nutrition and as a sedative to the aches and pains, and in manipulative correction of commencing deformities. The mother or nurse should be instructed how to assist in this, for it has to be kept up daily for a long time. As the skin of these little patients is moist and delicate, it is well that the massage should be done after the bath, and some sort of lubricant should be used, such as cold-cream, oil of sweet almonds, or vaseline agreeably warmed in a water-bath. Under this plan of treatment Dr. Symons Eccles has had the good fortune to witness beneficial results in more than twenty cases.

Flat-foot, or Weak-foot, is somewhat allied to lateral curvature of the spine in its causation by overweight pressing bones in wrong directions that are feebly held together by weak muscles and lax ligaments. Frequently found in those who suffer from rickets, it is not inappropriate to speak of it here. Some people are born flat-footed, some people acquire flat-foot, others have flat-foot thrust upon them. Some people suffer from flat-foot, others do not suffer from it at all even when it is acquired. If they have good, strong muscles and an abundance of invigorating exercise, they are less likely to acquire flat-foot, and if they do, they suffer much less or not at all from it when it comes. Sandow is flat-footed and has no inconvenience therefrom.

The general appearance of weak-foot is recognized by the inward turn of the leg, by the projection of the internal malleolus and the inward and forward turn of the external, by the eversion of the foot and the sinking of the arch. If the patient complains of pain

and weakness about the sole, instep, ankle, and calf, even though the arch is high we may suspect that it is yielding and being unduly stretched, and on examination we may find that the tissues in the sole are lax and flabby. If comfort and support are derived from a pad in the sole, held in place by a figure-of-eight bandage around the ankle and instep, our suspicions will be confirmed, and treatment by support, massage, and gymnastics should at once be instituted. In mild cases support for the arch may not be necessary.

For the purpose of restoring the instep to its natural shape, position, and mobility appropriate massage and manipulation are highly commended by all our best orthopædic surgeons, and for the purpose of strengthening the muscles that hold the foot in proper position massage and resistive movements work admirably. They do not interfere with an arch support, but reconcile the tissues to its unwonted pressure, and in many cases the foot and leg can be made so strong that supports can be laid aside. The whole foot and leg should be *masséed* by friction and deep manipulations, and the muscles on the front of the leg and inside of the calf should be percussed as well. Much tact should be used in pressing on the sole with the thumbs and fingers and the heel of the hand so as to coax and push the arch up into place without unduly hurting. Resistive movements should alternate with the massage, and much skill acquired by experience can be utilized in doing these. With the fingers surrounding the base of the toes on their dorsal aspect strong and regular pulls should be made while the patient pulls the foot up in dorsal flexion. This acts principally on the tibialis anticus, which will then be induced to make stronger efforts to pull the arch up and in. Resisting inward motion of the foot at the base of the great toe strengthens the adductors of the foot (the tibialis anticus and tibialis posticus) and helps to bring it back and hold it in better position. The patient should be instructed to do these movements voluntarily without resistance and to walk on the outside of the foot at regular intervals several times a day, and also to flex the toes vigorously downward until fatigue approaches, for this is a valuable means of strengthening the muscles of the sole. Walking on the heels is also a useful exercise, but raising on the ball of the foot is of very doubtful propriety until much improvement and strength have been gained, and even then it is safer to omit it. The best way of doing this is that recommended by Brad-

ford and Lovett: The patient stands with the feet turned out, rises slowly on to the toes, turns out the heels, and sinks slowly to the ground, repeating this a number of times. It is well to give the anterior part of the foot an occasional vigorous pull inward so as to stretch the contracted peronei, and the patient should be shown how to do this (see Fig. 39), for his own hands and arms are situated in the best possible manner for pulling the foot while making a counter-push above the ankle. Standing on the outer aspect of the heels and turning the feet up and in is an admirable exercise for flat-foot. Resisting outward motion of the foot helps to some extent, for by cultivating the contractility of muscles, even though they are already in a state of contraction, we at the same time cultivate their qualities of extensibility and relaxation. Landerer has treated two hundred cases of flat-foot in ten years, and in not a single instance have massage and gymnastics left him in the lurch. In illustration of these remarks the following five pictures are of great interest. (See Figs. 40 to 44.)

Anterior Metatarsalgia.—This is a very annoying and painful affection, starting from the anterior part of the sole and often extending up the leg and thigh. Weakness and sinking of the anterior transverse arch of the foot and compression of the external plantar nerve between the fourth and fifth metatarsophalangeal articulations are the factors that give rise to it. When these conditions are aggravated by a tight shoe the patient is in the stocks and suffers the torment of the damned, as the writer himself can testify. The majority of these patients would rather continue to suffer than wear a shoe wide enough at the toes to set them free from compression and pain. A support to restore the anterior arch is often applied without much regard to whether the patient can bear it or not, for often there is so much hyperæsthesia and neuritis that no support of any kind, not even a bandage, can be tolerated. In such a condition careful massage affords immense relief and comfort, and this can usually be kept up in the intervals by wearing a low shoe made wide enough at the ball of the foot to avoid compressing the toes in any way. Besides the active and resistive movements already mentioned for flat-foot, pressing with the heel of the hand on the ball of the foot in the middle of the transverse arch while the patient extends the foot is an exercise of the utmost value in these cases, for the pressure restores the arch in an agreeable

FIG. 39.—Showing how a person can stretch his own peronei muscles.

Fig. 40.—Patient fifty years of age, weighing two hundred and twenty pounds. Flat-fo
from sprain and fracture of external malleolus, four years. Great difficulty in walking all th
time. In five weeks, with massage, exercises, and support, can run up and down stairs, wa
two or three miles, and the foot is comfortable whether the instep is held up by support
down flat without it, as in the picture. Four months after this picture was taken the patie
walked four or five miles over sandy hills for pleasure.

Fig. 41.—The same patient a few minutes after the preceding picture was taken.

Fig. 42.—The arch of the flat-foot before massage on the same day that the other pictures were taken.

Fig. 43.—The arch of the same foot, much higher, after fifteen minutes of massage and resistive movements, on the same day that the other pictures were taken.

manner at the same time that the muscles are contracting that hold it in place. A downward pull against dorsal flexion rounds the arch from above, and the alternation of these by skilful hands makes an invigorating, agreeable, and corrective exercise. Flexing the toes vigorously without resistance helps to restore the transverse arch by bringing into action the transversus-pedis muscle that holds it together. (See Fig. 32, page 72.)

XX.

Massage in Sprains, Bruises, and Dislocations.

"Constant blessings, like constant pressures, are the last to be discovered."—JAMES MARTINEAU.

IN the "Life and Letters of Mr. George P. Marsh," Volume I., page 219, is the following account of the brilliant success of the treatment of two sprains by a wild Arab: "There seemed, however, small chance that the proposed journey to Sinai, Petra, Jerusalem, etc., could be carried out. The season was already far advanced for desert travel; Mr. Marsh had seriously sprained his ankle at Karnac while carrying his wife through the great temple, and could not now walk without the assistance of two persons; and Miss Paine had been suffering from a somewhat similar sprain even before leaving Constantinople, and had profited little by the surgical skill of the Franks at that place or in Egypt. The dragoman, though it was clearly for his interest that the journey should be made, admitted the impossibility of it under these circumstances, and gravely proposed that the two sprains should be cured at once by an Arab doctor of his own acquaintance. He entreated so earnestly and with such apparent confidence in his miracle-worker that a consultation was held with some of the oldest and most intelligent of the Frankish residents at Cairo, and, though no one would exactly take the responsibility of advising it, every one said that the evidence of these immediate cures was such that he should certainly try the experiment in his own case. Some, indeed, had tried it with entire success, and no one thought any harm could come of it.

"These considerations, added to an intense desire to see more of the mysterious East, decided the lame patients to call in the '*radoubeur.*' So, the second morning after their instalment in their hotel, Achmet presented himself, bringing with him the most extraordinary creature that can be well imagined. He was scarce five feet in height, and was clad in a single garment of blue cotton fastened about the waist with a leather belt. His old, withered face was lighted up by one eye only, and that seemed but half open,

while nothing about his person would have led one to believe that the waters of the broad Nile were within reach. There was an unmistakable look of mortification on the part of those who had consented to summon this Æsculapius, but there was no help for it now. At this moment a visitor was announced to Mr. Marsh, and the lady therefore was the first to prove the wild man's skill. He examined the injured foot, placed it in warm water, dipped his own fingers in olive oil, and rubbed and pressed the foot very gently for about twenty minutes. He then carefully dried it and bade his patient walk. She hesitated, having suffered so much and so long from every effort of that kind; but an imperative '*Imsheh! imsheh!*' decided her. She placed her foot firmly on the floor and took a step, another and another, and still no pain. In a few minutes she was in the street, and after strolling some hours among the bazaars of the city returned without the least feeling of discomfort. The cure was perfect and permanent.

"In the meantime Mr. Marsh had passed through a more severe ordeal at the hands of the magician. His foot and ankle, which were both badly swollen and discolored, were very sensitive to the manipulation, and especially to the energetic pulling which in this case was a part of the treatment, and at the end of three-quarters of an hour he was well-nigh exhausted by the pain. But then, on looking at his foot, he was surprised to find that the swelling had disappeared, the color was almost entirely natural, and the shoe and stocking, which had been laid aside for almost two weeks, were put on with perfect ease. He was then directed to walk, which, to his amazement, he found he could do without the least pain; and the only unpleasant sensation he experienced afterwards was a slight stiffness for the first day or two, which, however, did not in the least interfere with walking. After this, preparations for forty days' wandering in the desert were made as rapidly as possible."

Making allowance for the enchantment that distance always lends, there is little doubt that these two injuries were much benefited by the manipulations of the wild Arab. But it is very evident that he hurt his second patient much more than there was any need of. It would, indeed, be strange if the teachings of science did not enable us to improve on the methods of blind instinct. And though science often follows art with limping strides, here we can say that science has caught up with art and together they work for the

rapid amelioration of disabled joints. No sane person would think of having massage applied immediately to the seat of a sprain, but many imagine that this is what the *masseur* will do, and hence deprive themselves of the early benefit that might be got from this method of treatment, which quickly relieves the pain, the heat, and the swelling, removes the pressure from terminal nerve-filaments, and prevents the parts from sticking together. No two *masseurs* are alike by nature nor in skill, tact, and education, and the one who knows his anatomy and physiology well, when called to a recent acute sprain, will not begin at once to *masser* the injured joint, but at a distance above it on the healthy tissues by gentle stroking or *effleurage* towards the heart, gradually proceeding nearer and nearer to the painful place. This has a soothing effect and pushes the flow along in the veins and lymphatics, making more space in them for the returning currents coming from beyond and carrying away fluids that have leaked out of the vessels. The same should be done on the part of the limb beyond the joint, for the circulation is hindered both in going out and coming in by reason of the swelling.

Next, the *masseur* who knows his business will begin again at a safe distance above the injured joint, and use deep rubbing, kneading, or massage properly so called, one hand contracting as the other relaxes, alternately making circular grasps, with the greatest pressure upward, and this should be done on the parts above and below the seat of sprain. By this procedure the effects of the previous stroking or *effleurage* are much enhanced, an analgesic or agreeably benumbing effect is produced upon the nerves which extend to the painful place, and the retarded circulation is pushed along more vigorously, making room in the vessels for the swelling, the effusion, the dammed embargo caused by the landslide of blood and lymph that is inundating the surrounding territory with exudates farther up the stream to float off, and preparing the way for the next step in treatment. At the end of fifteen or twenty minutes of this manner of working, gentle, firm pressure can be made immediately over the swollen and but recently very tender parts, which in a few seconds can have circular motion, with the greatest push upward added to it; and this, if sufficient tact be used, will in all probability not hurt, but be positively agreeable. By this the swelling is spread over greater space, pressed out of the

tissues as water out of a sponge, and brought into more points of contact with the veins and lymphatics, by which it is absorbed and carried off, the same pressure that causes the dislodgement of stagnating fluids also aiding absorption by pressing them into the small vessels. Then a snug, well-fitting bandage should be applied, which may exhibit the bungling of a tyro or the skill acquired by twenty years' practice. Under this plan of treatment, used twice a day, the comfort produced and the speed of recovery would scarcely be believed unless experienced by one who had had a similar injury treated in the regular orthodox way, with absolute rest and immobility, by means of fixed dressings.

Some years ago I published the results of massage in more than seven hundred cases of sprains, joint-contusions, and distortions of all degrees of severity, treated by many different observers, most of whom were French, German, and Scandinavian army surgeons, in order to confirm the experience obtained in some of my own cases. The invariable result of each and all was that such injuries thus treated got well in one-third of the time that similar cases did under the usual method of absolute rest and fixation and with less tendency to subsequent weakness, pain, and stiffness. Experience teaches that the sooner after a sprain massage is begun, the quicker is the recovery. In Germany the military authorities now require a semi-annual report from their surgeons upon the results of massage in injuries of joints; and the statistics of Gassner, Starke, Körner, and others clearly show the rapid results of this method and the economy of time to the soldier. I fear it will be a long time before many of the physicians and surgeons in the United States will condescend to try their hands at massage; indeed, most physicians adopt, prescribe, or tolerate massage for the same reason that Constantine the Great embraced Christianity—more from policy than conviction.

The orthodox treatment of absolute immobility alone in these cases has little else to support it than the dogmatism of centuries, from which it is almost impossible for a surgeon to free himself unless he has been the unfortunate victim of a sprain and had it treated with massage. Supposing a prize of ten thousand dollars were offered for the quickest way to make a well joint stiff, what more effectual means could be resorted to than first to give it a wrench or sprain, and then do it up in a fixed dressing, so that the

resulting inflammation would have an opportunity of producing adhesion of the parts? And this is the prevailing treatment of sprains. The same plan of treatment is employed for the purpose of closing up holes in other parts of the body—namely, that of exciting adhesive inflammation; and, unfortunately, it sometimes closes the cavity of a joint also.

It would seem as if we had sufficient proof of the beneficial effects of massage in injuries and affections of joints in human beings without intentionally inflicting similar injuries on animals in order to treat them by massage and study the effects of this upon them. However, much interesting and confirmatory evidence has resulted from such experiments, and the effects produced are no longer left in the realm of theory, but brought into the sunny light of science and ocular demonstration. The mind of man may be prepossessed in favor of massage, and this would help recovery; of animals it cannot be, unless they had had massage before for a similar hurt. Animals that have been treated by massage can be killed and the effects studied and compared with similar injuries in other joints of the same animal that have not had massage. Von Mosengeil, professor of surgery at Bonn, injected corresponding joints of rabbits with India ink. With each rabbit he *masséed* one of the joints at regular intervals and left the same joint in the other limb untouched. The swelling and stiffness caused by the injection rapidly disappeared under massage, and on examination of the *masséed* joint after the animal was killed it was found empty of its colored contents. Even when the examination was made shortly after the injection and the use of massage there was scarcely any ink found in the joint; part of it was found upon the synovial membrane, and upon microscopical examination it was seen that the greatest part of it had been forced into and penetrated through the synovial membrane. The darkened lymphatics could even be seen with the unaided eye extending from the injected joint to the lymphatic glands in the groin or axilla, and these latter were also black from the absorption of the ink. Upon examination of the joint-cavities that had not been *masséed* the ink was found in the joint mixed with the synovia, forming a smeary mass, and it had not even penetrated the tissue of the synovial membrane. The same results were uniformly obtained in all the experiments, showing that absorption takes place from joint-cavities by means of lymph-

spaces and small openings communicating with lymphatic vessels, and through these with lymphatic glands. This evidence was highly confirmatory that the structure and functions of the synovial membrane are similar to those of the pleura and peritoneum, where the pump-like action of respiration causes the lymphatics to suck up and propel onward both natural and morbid products. The sheaths of the tendons having a similar structure would be influenced in like manner by massage, passive and active motion.

But by far the most interesting experiments yet performed to elucidate the effects of massage on joints, muscles, and nerves are those described at length in the *Archives générales de Médecine* for 1891 and 1892. Having obtained excellent results from massage in bruises of joints and muscles, in sprains and dislocations, and also in fractures, some of which were *masséed* from the commencement of the injury when there was no displacement, and others where there was displacement, after a fixed dressing had been applied as short a time as possible to keep the parts in place, M. Castex sought further opportunities to study more exactly the results of these injuries by intentionally producing them in corresponding places in two limbs of dogs, *masséeing* the seat of one of these injuries and letting the other alone, and after five or six months killing the animals and examining the tissues that had been hurt under the microscope. He always chose the more injured limb for treatment and the other had no massage, but was left to the natural evolutions of the injuries. The effects, immediate, consecutive, and remote, were carefully noted by experts in laboratory work, who were not told which leg had been *masséed.* The experiments were done in the laboratory of Professor Richet. The massage was done either immediately or very soon after the injuries—even, in the case of the dislocations, as soon as they were set—and always with marked relief to the pain, swelling, and stiffness,—so much so, indeed, that after a few massages of five or ten minutes each of frictions and *pétrissage* once a day the dog had full use of the leg that had been *masséed,* whereas the leg that had not been *masséed* remained swollen, stiff, and painful for a long time, and in some did not recover at all. It is but fair to state that, no matter how severely some of the dogs were injured, especially the shepherd dogs, they did not seem to mind it at all after it was over, running about as if nothing had happened as soon as they were set at

liberty. These were not chosen for massage. The details are amazingly interesting, but space forbids mention of more than one of the experiments, which may be taken as a fair sample.

The two shoulder-joints of a large watchdog were dislocated by inward flexion. The head of the humerus of each was plainly visible under the skin, showing a luxation forward and inward—intra-coracoid. It was easily reduced—put back in place—by traction. Five minutes of massage was at once given to the right shoulder, which seemed to afford relief, judging from the grateful way in which the animal submitted, and after this a figure-of-eight bandage was applied around both shoulders. He had massage five minutes daily to the right shoulder alone, and for the first three days he walked with difficulty. The right shoulder gradually became less painful to touch and he stood firmer on this side. On the fourth and subsequent days all sorts of pressure upon the *masséed* shoulder were borne without discomfort, but when the other shoulder was pressed the dog growled and attempted to bite. Six days after the dislocations he supported himself well on the *masséed* limb, but held the other up, as the *non-masséed* shoulder was still swollen and painful. Both shoulders then stayed in place in spite of passive movements that might have dislocated them. On the eighth day the dog walked well with the *masséed* limb, but held the other up, as the latter was still swollen and painful and there was crepitation in the joint. Thirteen days after the injury the dog took an occasional step with the limb that had not been *masséed,* and two months later it was in about the same condition, while he made free use of the limb that had been *masséed* in walking and running. There was then atrophy of the muscles of the left shoulder, evident by the prominence of the bones, but none of the muscles of the right.

Testimony in favor of the early use of massage in dislocations in human beings, being careful not to move nor disturb the joint, is gradually accumulating. Not only M. Castrex, but also MM. Fége, Archambaud, and others, have reported more favorable results from its application from the very first day of the injury than when it had not been used. Passive motion, I think, should not be begun until the patients find that they can make a little voluntary motion. Fifteen or twenty days of this treatment seems to b all that is necessary in mankind, and this is just about the lengt of time required for the repair of the rent in the capsule. In th

meantime the surrounding tissues are preserved in health and activity by means of the massage.

Soon after the swelling from the injuries to the dogs had subsided the muscles became more or less atrophied in the limb that had not been *masséed*, but not at all in the limb that had been *masséed*. At the end of five or six months the dogs were killed and the tissues examined with the microscope. The muscular tissue of the side that had not been *masséed* presented a diffuse sclerosis or hardening; the connective tissue intervening between the fibres and bundles of fibres was thickened; there were interstitial hemorrhages, especially in the cellular tissue around the muscles; the internal and external coverings of the bundles of muscular fibres

FIG. 45.

Bruised muscle without massage. *f*, muscular fasciculus; *c*, intermuscular connective tissue.

FIG. 46.

Bruised muscle with massage. *f*, muscular fasciculus; *c*, intermuscular connective tissue.

Fig. 46 shows that the natural size of the intermuscular connective tissue has been preserved, while Fig. 45 shows the intermuscular tissue thickened, and the muscular bundles thinner and compressed. (From the *Archives générales de Médecine*, Fevrier, 1892, p. 197.)

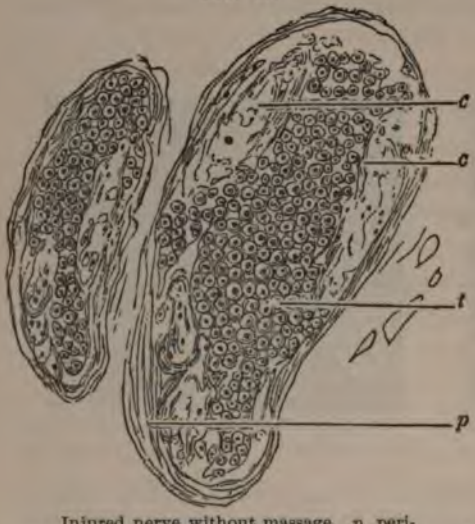
(perimysia) were infiltrated with blood, and also the fascia or covering outside of this. The transverse markings of the muscular fibres (striæ) were effaced in many places, while the longitudinal striation or marking, which is not seen normally, was very distinct. The muscular tissue from the corresponding region that had been *masséed* was found to be normal in every particular. M. Castex has left us to surmise the appearance of the sarcolemma or covering of the individual fibres. In all probability this also was hardened, thickened, and infiltrated with blood, as were the outer and larger coverings.

The blood-vessels appeared perfectly natural from the *masséed*

side, but from the side that had not been *masséed* they presented a hyperplasia, or thickening, of their external coat.

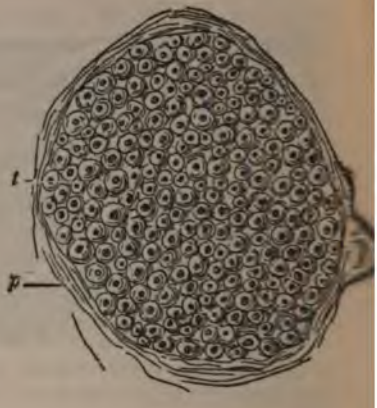
The nerve-filaments were found to be natural in the *masséed* side, while in the side that had not been *masséed* there were abundant evidences of neuritis and perineuritis exerting destructive compression upon the nerve-fibres. The perinurium, or sheath covering the bundles of nerve-fibres, was at least three times as thick in the *non-masséed* side, and the connective tissue around the perineurium was also thickened with numerous new-formed cells. The small vessels in the perineurium were also the seat of a periphe-

FIG. 47.



Injured nerve without massage. *p*, perineurium; *t*, nerve-tubes or fibres; *c*, new-formed connective tissue.

FIG. 48.



Injured nerve with massage. *p*, perineurium; *t*, nerve-tubes or fibres.

In Fig. 48 all the nerve-elements are of normal appearance, while the nerve-elements from the *non-masséed* side (Fig. 47) show that the perineurium is thickened, and underneath this there are deposits of new-formed connective-tissue which crowd and compress the nerve-fibres. (From the *Archives générales de Médecine*, Fevrier, 1892, p. 200.)

ral hyperplasia, or thickening. The lesion of the nerves was more marked than that of the vessels.

In human beings M. Castex found that when massage was begun early or from the very first in contusions, sprains, and dislocations not only were the immediate symptoms soon relieved, but also the subsequent serious consequences that are so apt to follow these injuries — wasting, weakness, contraction, and stiffness — were prevented. But when he tried massage in old cases of muscular atro-

phy or wasting following injuries to joints he got no increase of muscular tissue. The stiffness was got rid of; the muscles became suppler, but they still remained thin and lacking in strength. If he had combined passive and active movements with the massage, he would probably have gained growth of muscle. He found that the galvanic and faradic currents were of benefit in promoting increase of muscular tissue. Muscular contraction produced by electricity is but another form of motion.

Numerous theories as to the cause of muscular atrophy from injuries to joints have been considered and abandoned. The most probable and most generally accepted is that of reflex action. The injury to the joint starts up more or less inflammation (arthritis); the articular nerves are irritated; this irritation is transferred to the spinal cord; the nerve-centres affected act in turn upon the centrifugal nerves going to the muscles, and these determine at their peripheral ends the muscular atrophy. With a view to the elucidation of this M. Deroche has repeated seven times, and always with the same results, experiments which were done for the first time at the College of France by MM. Raymond and Onanoff. He divided the posterior roots of the three last lumbar nerves on *the left side* in dogs and rabbits. After cicatrization had taken place he assured himself that numbness was complete from the thigh to the knee of the left lower limb, so that irritation of this region was not felt. The corresponding limb was left intact. An arthritis was then excited in both knees by introducing a thermocautery into them. *No pain was felt in the left knee,* but much in the right. Three months afterwards the animals were killed, and in both knees the lesions of arthritis were found; *but the muscles of the thigh of the left leg were of natural size; of the right, atrophied.*

Professor Simon Duplay and M. Cazin have also made a careful study of this subject in much the same way. Under the microscope they found that the articular filaments always presented signs of inflammation, but the large nerve-trunks and spinal cord showed no appreciable change, and the results of the examination of the muscles were negative except as to diminution in size. They therefore concluded that muscular atrophies consecutive to joint-injuries consist of simple atrophy, and that this can only be explained by a dynamic action, a simple reflex due to irritation of the terminal nerve-filaments of the articular nerves.

M. Deroche thought he found that the muscular atrophy was due to diminution of interfibrillary substance, and that there was an ascending degeneration of the posterior columns on the same side. However that may be, the inference is certainly justifiable that massage acts to prevent muscular atrophy by maintaining an influence, a movement, or something in the muscles which the spinal cord is for a time unable to impart to them; and in order to do this it should be applied immediately or soon after the injury, for then the muscles are more quickly aroused from the lethargy and stupor into which they have been plunged by the shock of the accident.

It is a wonder how the shoulder-joint ever stays in place with nothing but muscular action and atmospheric pressure to hold it. On account of the length and laxity of its ligaments one would think that the large head of the humerus would be continually slipping out of the small and shallow glenoid cavity. I have recently had a patient who could throw the head of the humerus downward for a considerable distance at will and then jerk it back again.

As it does not seem to be generally understood how Kocher replaces the head of a humerus that has been displaced inward and forward, it may not be amiss to reproduce here the following pictures which show in a clear and interesting manner the method and its rationale:

SUBCORACOID DISLOCATION OF THE HEAD OF THE HUMERUS.

Figs. 49, 50, 51, and 52 illustrate the method known as Kocher's.

FIG. 49.—The arm is adducted until the elbow touches the side of the chest; no marked difference is seen in the position of the head of the humerus.

FIG. 50.—The still adducted humerus is fully rotated outward by means of the flexed forearm; the rent in the capsule is more plainly seen; the head is nearer the acromion and farther from the brachial plexus.

FIG. 51.—Whilst retaining the adduction and outward rotation, the arm is fully elevated and brought forward.

FIG. 52.—By rotation inward the complete reduction is effected.

XXI.

The Treatment of Sprains and Synovitis by Massage,

WITH A REPORT OF ITS RESULTS IN OVER NINETEEN HUNDRED CASES: RECOVERY IN ONE-THIRD OF THE USUAL TIME UNDER OTHER METHODS OF TREATMENT.

" Oh, this is well; he rubs the vein of him."

In various affections of joints, more than of any other parts of the body, massage has been used successfully. Testimony of this is so abundant that it will be impossible to make use of it all here. Those joints whose capsules are accessible to the immediate pressure of massage have responded most favorably to such treatment, while the hip and shoulder-joints that are covered by muscles and not so easily got at have not yielded so readily. For convenience the effects of massage upon joints may be spoken of as local, revulsive, and sympathetic. It may be used to increase the circulation in and around a joint, or to squeeze congestion and exudation out of it with one hand while the other pushes along the circulation in the veins and lymphatics above the joint, or the joint may be avoided altogether while the muscles above and below it are *masséed,* thus making more blood go through them and less to the joint. It would seem as if the vascular and nervous supplies of joints had been prearranged with special facilities for the influence of massage upon them. With regard to the direct, sympathetic, and reflex effect of massage upon the nervous supply of joints the broad generalization so well expressed by Dr. John Hilton is of the greatest interest, namely, that " the same trunks of nerves whose branches supply the groups of muscles moving a joint furnish also a distribution of nerves to the skin over the insertion of the same muscles, and the interior of the joint receives its nerves from the same source. This implies an accurate and consentaneous physiological harmony in these various coöperating structures. Without this normal consentaneous muscular and sensitive function, precision of action would be lost, and unnecessary exercise of muscular force would be employed during the performance of any of their functions."

Still another interesting fact concerns us at the present time, and that is the abundance of Pacinian bodies around the joints, whatever significance this may have. When cramp can be localized, the pain is mostly felt at the joints, and where in tissues accessible to massage pain can be severely felt, there massage is most efficacious and agreeable.

The public in general have a very good idea of what a sprain is in speaking of it as a wrench or twist of a joint, but they have not a very clear idea of what it is *not* in confounding it with a simple strain of muscle, or fracture into a joint without displacement, or the first sign of weakness of a joint due to other causes.

What is a sprain? I was once present at a medicolegal examination where the attorney asked a very distinguished surgeon this question. He was so taken aback that I begged leave to answer it for him, which I did in the following words: "A sprain is a sudden, partial displacement of two joint-surfaces followed by immediate replacement; and if the patient has fallen from a height, there will be contusion of the joint-surfaces as well. The attachments of the joint on one side are stretched beyond their natural limit, and on the other unduly compressed. If the patient has fallen squarely on a joint, there may be only contusion of its surfaces without strain of its attachments; and in this event the external symptoms may be slight or absent, while the discomfort is very great."

My distinguished friend looked at me with a smile of relief and congratulation, evidently crediting me with the elucidation of a sprain on the spur of the moment. In this he was mistaken, for I had been studying it for some time, and had just constructed the above definition to suit myself, having previously searched the text-books in vain for anything like a satisfactory definition of the word "sprain." This was in 1888, and I have since had the pleasure of seeing this definition cribbed by good authority.

A few words with regard to influences predisposing to sprains may not be amiss. In some people I believe that there is a want of involuntary control in the nerve-centres that preside over the muscles of the lower extremities. How else can we explain why some lackadaisical people frequently turn their ankles while walking on an even surface? In others, according to my own observations, high ankles are undoubtedly a predisposing influence. I have told many

well people with high ankles that they frequently sprain them, and rarely have I been mistaken. The higher an ankle the more a lateral force at the edge of the foot will act upon it. The ankle admits of flexion and extension, and not of lateral motion, as many suppose. It might have been better if nature had allowed it some lateral motion, as this would probably have lessened the frequency of its being sprained. Indeed, some loose-jointed people have the faculty of turning their ankles sideways to quite an extent without injury. But it may well be asked, How is it, then, that ankles are seldom sprained while skating? When skating the will, nerves, and muscles are on guard over the ankle; at other times they are less likely to be so concentrated.

We need not spend much time with the symptoms and diagnosis of a sprain. When a patient complains of a joint, saying he does not know whether he has a sprain or not, we may be pretty sure that he has not sprained it; for a sprain makes itself known with tremendous rapidity, and always before a patient is quite ready for it. When it is accompanied with nausea and faintness as well as pain it is apt to be pretty severe; and when, in the case of the ankle-joint, the patient cannot walk, we may suspect fracture.

The pain is attributed to stretching or tearing of the nerves, and its continuance to pressure of the effusion upon the ends of the nerves. Swelling, heat, and discoloration are usually present. The least important of these is discoloration, for rupture of a very small vessel may cause a great deal of ecchymosis, giving the patient much alarm, in which the physician sometimes shares unnecessarily.

Immediately after a sprain there is often so much swelling, ecchymosis, and general pain that a man with a brilliant imagination can diagnosticate anything he pleases—rupture of tendons, ligaments, or fracture; the graver the diagnosis, the better for the physician and the worse for the patient. A few massages properly given—by relieving the heat, the pain, and the swelling—will often clear up the diagnosis wonderfully and show whether there is a cracked bone or not. When the swelling does not disappear quickly under massage and bandaging it is a pretty sure sign that we have something more than a sprain to deal with, probably a fracture without displacement of fragments, or possibly something worse.

Opportunities for the examination of sprains after death are few, and these are probably of the most severe character. Litera-

ture on this subject is scarce and hard to find. Dr. Georges Berne, of Paris, has made some valuable researches, and to him I am indebted for much information about the nature of the injury. Sometimes the ligaments have been found broken, sometimes torn from their attachments. Moutard-Martin, at the autopsy of a man who had shortly before death sprained his knee, found rupture of the internal lateral ligament.*

The muscles are sometimes ruptured, and this usually occurs at their junction with the tendinous fibres. The tendons may be lacerated, luxated, or expelled from their sheaths. Sédillot, in a sprain of the knee, found, after death, rupture of the muscles of the *patte d'oiè* (aponeurotic expansion formed by the tendons of the sartorius, gracilis, and semitendinosus at the upper and inner aspect of the tibia).

The synovial membrane has been found red and vascularized, sometimes thickened and covered by false membrane. There may be an effusion of fluid—serous, serofibrinous, or serosanguinolent; at times it has been found hemorrhagic. Unless the injurious force has been of a bruising nature the larger vessels and nerves are seldom the seat of injury, as their yielding character protects them from rupture by traction or elongation.

It has long been a mystery to many of us why sprains of the fingers do so badly, as they have no weight to carry. This is well accounted for by the investigations of M. Ségond, who has found in these cases a constant lesion, namely, tearing of the two slips of insertion of the extensor tendon of the last phalanx, carrying away a small *sliver* (lamella) of bone, the terminal phalanx being flexed at a right angle. There was also dorsal ecchymosis.

M. Lagrange has observed in his experiments on the cadaver that after lateral forced flexion of the fingers, combined with slight rotation, there was tearing of the lateral ligaments not accompanied by any lesion of bone. When the finger was turned backward in forced extension upon the dorsal aspect of the hand by a brisk push a little cracking was heard. Dissection constantly revealed the avulsion by the anterior ligament of a slight linear transverse band of bone from either the proximal or distal side of the articulation. The areolæ of the spongy tissue were opened. In sprain of

* Société Anatomique, 1879.

the metacarpophalangeal joint of the thumb no lesion of bone was found. There was tearing or detachment of the external metacarpophalangeal ligament. Arthritis or ankylosis is to be feared in these sprains of the fingers.

It is generally agreed that it is almost impossible, on account of swelling and thickening of the tissues, to make out an exact diagnosis in these cases. Before the discovery of the X-rays, time and treatment might have helped to clear it up, unless the treatments had been of such a nature as to make the joint stiff. In due course of time, when it became evident that the tendon has become completely ruptured, suturing has been successfully performed. But this we have nothing to do with here.

According to old Nélaton, the best treatment for such cases consists in putting the finger in a palmar splint for eight or ten days, in order to favor repair; and after this massage and passive motion, thus hoping to avoid too prolonged immobility, which might cause ankylosis. Better advice could not have been given.

A very little contemplation of such disastrous results as these would soon lead us to the conclusion that absolute rest and "do nothing" would probably be the best kind of treatment. And this reminds us of what Dr. Oliver Wendell Holmes used to say of the study of pathological anatomy, that it is a good deal like the study of the fireworks after the Fourth of July. It does not seem to us that complete separation of ligaments or tearing away of a piece of bone ought to be included under the head of the sprain. It rather conveys to us the idea that there may be a sprain *plus* break of ligaments or detachment of a piece of bone when the diagnosis can be made out. The old writers used to speak of "sprain fracture," which is an expression well put.

An eminent surgeon once remarked to me, "What you do, doctor, with your massage and movements, is to cure the patients of the results of our treatment." The customary treatment of sprains and its results are well known—absolute rest in a fixed dressing, resulting often in recovery, but too frequently in stiff, weak, and irritable joints. Sometimes these joints are deliberately sprained over again by the surgeon, with a view to loosening adhesions and overcoming the stiffness. But, unfortunately, this plan may cause the adhesions to re-form stronger than ever.

A form of treatment that is no doubt well adapted for sprains

of slight or moderate severity of the outer aspect of the ankle has recently been revived by Dr. V. P. Gibney, of New York. It is strapping with strips of rubber plaster alternately at right angles to each other over the outer and lower third of the leg, ankle, and foot. Elevation of the foot overnight or for a few hours and immediate massage are advised as good preliminary measures before applying the plaster. And if good preliminary measures, why should they not be continued? This treatment is said to involve no loss of time, to require no crutches, and to be unattended with any ultimate impairment of motion. This plan of strapping sprained ankles with adhesive plaster was used with brilliant success by Dr. Wharton P. Hood's father on himself fifty years ago. It is well to call attention to these matters occasionally.

I wish now to propose a better, simpler, and quicker way of carrying out this same plan of treatment, as it is applicable at one and the same time to all mild sprains of foot and ankle. If the patient is wearing a well-fitting boot at the time of spraining foot or ankle, let him keep it on and walk about moderately. If the boot is not quickly snug by reason of the swelling, it should be laced tighter. I have twice walked off a mild sprain in this way myself. The pressure of the leather and motion of walking give a sort of automatic massage. And when we think of it, this is not so very wonderful after all, for it is safe and salutary to allow motion of sprained joints that does not cause pain. It is unnatural motion that has caused the injury, and even after this natural motion can often be immediately indulged in to a greater extent than either physician or patient take the trouble to find out.

Joints, tender and swollen, that do not admit of massage being applied directly upon them may be approached by commencing on the healthy tissues some distance above them and nearer the trunk, with gentle stroking in the direction of the returning currents of the circulation, and gradually proceeding downward. The healthy tissues beyond the seat of the malady should also be similarly treated, as the circulation is hindered in getting to and from them. Besides the soothing effect of this, which enables one to gradually encroach upon painful tissues, the circulation is pushed along more quickly, so that exudations are carried off more easily. After working a few minutes in this manner deep manipulation may be brought into play, proceeding in the same direction by beginning

above the painful joint and making the greatest pressure upward while gradually approaching the objective point, the effect of which is to lessen pain without decreasing ordinary sensation. As near as we can get to this by alternate stroking and kneading we will make a review on both the proximal and distal sides of it, and by repeated efforts of this kind in the course of fifteen or twenty minutes we will usually be able to make gentle, firm pressure upon the sore joint, and this pressure can imperceptibly have motion added to it, thus constituting massage properly so called, by which effusions and exudations are spread over greater surface, pressed through the meshes of areolar tissue, and brought into more numerous points of contact with veins and lymphatics, and these are very materially aided in their resorptive functions by the pressure of the massage. It should not be forgotten that when a light touch is disagreeable firm pressure often affords relief. Recent periarticular effusions that have not become organized are thus speedily dispersed and absorbed, while superabundance of intracapsular fluid is pressed into the absorbents, the function of which within the joint is increased by the pressure from without, and by the acceleration of their current from the massage above the joint.

In recent sprains and synovitis this method is rational. It relieves the pain not only by the inherent soothing quality of massage, but also by removing pressure from terminal nerve-filaments; it reduces elevated temperature by hastening absorption, and thus removes the tension which causes lymphatic and venous stasis and exudation, and at the same time it increases the area and speed of the circulation. The comfort to a joint even after a single sitting would hardly be believed unless felt or witnessed. The effect is continued by a bandage well applied after the massage, but the pressure of a bandage, though it affords support, is at the same time by its continuous pressure a hinderance to the circulation and will not take the place of massage, which is an intermittent pressure and an aid to the circulation.

Kraske has demonstrated that the application of a rubber bandage to the leg of a rabbit for six hours has produced hyaline degeneration of the muscle, from which they do not recover. If we want weak and atrophied muscles, let the bandage be continued after the swelling has disappeared. Rubber bandages I never advise except for temporary use, as when a patient with a weak joint wants to go

sea-bathing. They are intensely disagreeable on account of the smell of the rubber combined with the perspiration which they produce. They are dangerous by literally strangling the tissues, for each turn, by its elastic tension and hug, represents much more compression than the force used in putting them on. Often I have taken them off and applied a domett (or cotton flannel) bandage, and always to the great delight and comfort of the patient. Bandages cut across the bias I used for a dozen years before I came unbiassed towards them. Take one in your two hands and give it a pull, and reflect for a moment, and you will see that it stretches much more at the edges than it does in the middle, so that when it is applied it presses unequally, and soon after it is put on it is as loose and lacking in support as a rubber bandage is tight and uncomfortable. A domett bandage is firm, soft, warm, and comfortable, and when one has put one on, he knows what he has done, and a few extra layers of this will often take the place of splint and plaster.

Every man thinks his own method of massage and bandaging the best, as every housekeeper who cooks her own beans thinks they are the best. Under the plan which I have just outlined we will be agreeably surprised and somewhat disappointed to find that most sprains of even more than ordinary severity will get away from us inside of a week or ten days.

Massage and bandaging may be done once or twice daily or every other day, as may seem necessary. Patients are generally ready to recognize improved power of motion and to make use of it. If they do not, the *masseur* can judge for himself by passive and resistive movements how much or how little the joint is capable of, and encourage or restrain motion accordingly. In recent cases it is preferable that the patient manifest the first desire to make use of the joint, for it is often impossible to tell how severe the injury may have been, and if the patient be not of a nervous temperament, sensations and inclinations can generally be trusted. The vast number of sprains of all degrees of severity that have recovered in from seven to nine days under massage would seem to prove either that rupture of ligaments, tendons, and laceration of muscles, with effusion of blood into the joint, occur much less frequently than is supposed, or else are of much less serious import when treated by massage. Further advantages of massage in these

cases are the prevention of the formation of adhesions and the loosening of old ones that are neither too deep nor too strong. After time for repair has elapsed, in order to gradually increase the strength of the muscles, as well as the confidence of the patient in using them, there is nothing better than resistive motion, alternately resisting flexion and extension or other natural movements of the affected joint while keeping the resistance less than the strength of the contracting muscles, so that the patient may not recognize any weakness. It is rank nonsense to tell a patient to walk or use a limb that has been weakened by injury and long confinement in splint or plaster without gradually training the strength of it in the way just pointed out.

Sprains of the ankle, instep, and knee seem to recover more quickly under massage than do sprains of the joints of the upper extremities. The fact that the joints of the lower extremities have to carry considerable weight while those of the upper do not, would seem to argue in favor of massage, for the use of a joint with pressure from above is a sort of automatic massage, which in the case of slight sprains of foot and ankle with a snug boot on may be quite sufficient to expedite recovery.

A curious feature that I have lately observed in several cases of sprains, muscular rheumatism, and stiffness after fractures is that coincident with improvement there is an increase of tenderness on pressure around the joints and over the muscles. This is different from the acute pain caused by pressing over a joint but recently injured or over muscles indurated with muscular rheumatism. I think it may safely be disregarded or perhaps considered a good sign, for those cases in which I have seen it all had returning suppleness of tissue and did well.

Do not think that any one can *masser* a sprain. No two cases of injured joints are exactly alike. The treatment must be varied to suit the case, the rudder must be turned so that the sails will catch the breeze in order that the port of recovery may be quickly reached.

In 1877 I published an article in the New York *Medical Record* giving the results of massage in the treatment of three hundred and eight cases of sprains, joint-contusions, and distortions by seven independent observers, who were French, German, and Scandinavian surgeons, besides a few cases of my own, to illustrate

certain other effects of this treatment. In these cases, which seemed to be of all degrees of severity, the average length of time for recovery was found to be 9.1 days, and this time would have been much less if the thirty-nine cases had been omitted in which massage was not begun until from ten days to three months after the injury, in many of which it is stated other methods of treatment had failed, and which required, on the average, three weeks of massage before recovery. A study of fifty-five cases treated in the usual manner by these same observers showed the average time for recovery to be 26.16 days, or nearly three times as long as similar cases treated by massage. The earlier after the injury manipulation was employed, the sooner recovery followed. The advantages of massage in such cases would seem to be more speedy relief from pain and swelling and earlier and more perfect use of the injured joints than are usually obtained by any other method.

My distinguished *confrères,* Drs. Van Arsdale and Gallant, of New York, have treated twelve hundred and thirty-one cases of recent sprains by means of massage with better recovery in as many days as it took weeks under fixed dressings without massage. They obtained complete restoration of the functions of the limb with no subsequent weakness, stiffness, or pain. Some of their cases were so severely injured that the massage had to begin under an anæsthetic. They also obtained the best and quickest results in those cases in which massage was begun immediately after the injury, so that the patients did not know what they had missed in the way of prolonged recovery. Neglected cases and cases in which splints had been used gave very satisfactory results but took much longer. Van Arsdale and Gallant, after *masséeing* a sprain, have the limb rest for half an hour and then urge the patient to use it, presumably in spite of pain, after which it is kept elevated between the *séances* of massage, which are given twice a day.* I prefer to put on a snug bandage and keep the limb at rest for a few days unless the sprain be a slight one.

With regard to sprains Estradère thus expressed himself in his work on massage, published in 1863: "I have always been of the opinion that massage ought to be avoided whenever there were indications of inflammation, *but this is not so with reference to sprains.*

* Medical News, April 20, 1895.

Indeed, according to the opinions of MM. Bazin, Bonnet, Brulet, Elleaume, Girard, Lebatard, Magne, Méry, Quesnoy, Ribes, Rizet, etc., who have recently published their observations upon sprains cured by manipulation, such affections ought to be treated immediately by this procedure. The pain, ecchymosis, and swelling disappear as if by magic. Others, pushing the same thing a little farther, make use of massage even when a laceration of a malleolus exists, persuaded that they have made one step towards cure by removing the pain and swelling and by replacing luxated tendons. I admit that if the distinguished physicians who have related these facts had not persuaded me by their perfect accord in this matter of the harmlessness of massage in such cases I should have been very guarded in venturing to suggest it; but the facts are indisputable; however strange they may seem, we must admit them. As Rizet says in his monograph on the treatment of sprains by massage, impressed by the words of Baudens at the Academy of Sciences, that of seventy-eight amputations of the leg, sixty had their origin in sprains, it was with eagerness we seized opportunities to try this means, which, far from disappointing us, has given us unexpected success. . . . At the present time those physicians who have it in their power to make use of this method are unwilling to make trial of it, but allow their patients to go to bone-setters, charlatans, fortune-tellers, and sprain-blowers, who accompany their manipulations with divers mysterious signs. But we ought not, says Nélaton, to reject a useful means because it has been used by those unskilled in the medical art."

Dr. Beranger-Feraud, an old army-surgeon, gives an account of four hundred sprains which he treated successfully by means of massage in *L'Union Médicale du Canada* (Philadelphia *Medical Times,* November 20, 1880). These are spoken of as slight, medium, intense, and complicated, and the conclusion is that the nearer the massage is used to the time of the accident the sooner is the recovery, and a sitting ought to last until all feelings of distress and pain have disappeared.

Dr. Gassner, of Würzburg, military surgeon, has reported twenty-four cases of acute serous joint-inflammation from sprains treated successfully by means of massage.* The average stay of

* Allgemeine medicinische Central-Zeitung, September 4, 1875.

the patients in the hospital until they were perfectly well was eight and one-third days, while of thirteen cases of similar injury the average time in the hospital under rest and immobility was twenty-eight days. Only in severe injury to the joints, with considerable rupture of capsules, ligaments, or muscles, or harm to the bones, would he make use of immovable dressings, and after repair massage would be used to get rid of the consequences of previous immobility. Well he remembers the tardiness of recovery of his own sprained ankle and contused knee under the many weeks of regular treatment, and much he regrets not then having had massage. He quotes from Billroth, Volkmann, and Erichsen to show that, in spite of the most careful and conscientious treatment in the usual manner, even apparently slight sprains sometimes lead to serious secondary consequences.

Berghman, of Stockholm, has treated successfully one hundred and forty-five cases of recent traumatic joint-affections, contusions, and distortions, synovitis with serous effusion, or effusion of blood into the joint-capsule.* Seventy cases of these affecting the ankle recovered on an average of six days and twelve sittings, while thirty-eight cases of old sprains required twenty-two days and forty-four sittings. If a plaster-of-Paris dressing had been applied even for a short time, there was no prospect of speedy cure by massage, for under this the connective tissue proliferates and soon acquires a plank-like hardness.

Though this *matted, board-like* condition of the areolar tissue was a marked feature in a case of old sprained ankle which, as a last resort of the therapeutics of despair, had had a plaster-of-Paris dressing applied for six weeks, which had just been left off before the patient came to me for massage, having had but two massages in one week, the patient began to walk the following week without crutches, and in two weeks walked well. As it was with the utmost difficulty that this patient could have any massage at all, I gave her somewhat lengthy applications, and it was interesting to observe the suppleness of tissue that was manifestly being gained every few minutes. For several weeks at first the sprain was regarded as of no account, but gradually became worse, and for more than a year the patient had been obliged to use crutches.

* Schmidt's Jahrbücher, Band 172, p. 172.

Mullier treated thirty-seven cases of sprains with massage, and found the mean duration of treatment till recovery to be nine days, against 25.6 days that forty-two cases required under immobilization. As a means of diagnosis, before the X-rays were discovered, Mullier found massage highly advantageous, for in several cases the presence of fixed pain, of ecchymosis around and over the malleoli, of swelling and functional disturbance, would have led to the opinion that fracture was present, but after a few massages the uninjured continuity of the bone could be recognized and a proportionately speedy recovery was obtained. In others only after repeated massages was the swelling so diminished as to reveal the existence of fracture, and then appropriate immobilization was applied.* When swelling is tedious and difficult of removal by massage, we ought to suspect more serious mischief than sprain alone.

I have attended a number of mild sprains of the ankle where the patient had hobbled about for two or three weeks, in which one or two massages afforded complete and lasting relief from pain and hinderance of motion. But the following certainly was not a mild sprain: Mrs. W. L., an active lady of strong muscles, fifty-six years of age, in descending the stairs of a hotel caught the heel of her boot on one of the brass covers, and did not turn her foot, but turned herself over the foot and fell headlong down the stairs. The ankle was severely sprained, and it was impossible for her to walk or even to put her foot upon the floor. I saw her within an hour after the injury before swelling had become great. The capsule of the joint was tensely swollen and projected in front of the external malleolus, and the patient had no control over the foot. The tissues over the joint were extremely sensitive and could not bear the contact of either cold or hot water. On examination no evidence of fracture could be found. I expected greater swelling, and a six weeks' stay in the house for the patient, as the injury was certainly of such a nature from its mode of occurrence as to produce all the evils that may be found accompanying a severe sprain. I *masséed* the limb twice daily and after each massage applied a bandage tightly, and on the inside of the limb a splint. At the end of a week the patient could walk a little, and in ten

* Virchow and Hirsch's Jahresbericht, 1875, Vol. II., p. 333.

days was going about freely on foot. My friends, Drs. Stoddard and Corey, as well as the authors cited above, have reported similar cases in detail, with like favorable results.

M. W., forty-five years of age, strong and muscular, while playing golf one Sunday afternoon slipped and gave his right ankle a double twist. He immediately felt nauseated and had to lie down. He was in much pain all night and sent for me early in the morning. I found much swelling, pain, and discoloration below and around both malleoli. A hot bath, massage, and a snug bandage were applied twice a day; and on the fourth day after the accident he went to business without crutch or cane and walked up two flights of stairs to his lunch. He was not, of course, by this time entirely well, but so far recovered that only occasional massages were necessary afterwards. He made a good recovery notwithstanding that the same ankle had been sprained about a year before.

The following two cases illustrate the aphorism of Hippocrates, which says that "*anatripsis* can bind a joint that is too loose and loosen a joint that is too rigid."

Although Miss C. was a young lady of good muscular vigor and firm tissues, perhaps from presuming too much on these very qualities she had sprained one of her ankles three times within two years. The last injury was naturally the most serious, the foot turning violently inward as she alighted on a coil of rope while jumping into a row-boat. For the two or three weeks following she was treated with rest, bandages, etc., and after that she got about on crutches, walking stiffly and with pain, and thus she continued for three months without further improvement. Despairing of anything being done, she reluctantly consented to try massage, for she had had ordinary rubbing every day since her accident, which passed for massage. About three months after her mishap I was called, and on examination found that there was still considerable effusion in front of the external malleolus and behind the internal, pressure on which excited sharp pain, in the former more than the latter, and to these places was referred the pain which was aggravated by passive motion of the foot, and this pain seemed to be the chief symptom in limiting the passive motion to a very slight degree of flexion and extension. Stiffness and weakness of the muscles from the knee downward with induration of the cellular tissue were also marked features of the case. After twenty min-

utes' malaxation, or kneading with the palm of the hand and fingers, alternating with friction in an upward direction as far as the knee, the effusion was slightly diminished, the tissues were suppler, the limb felt more comfortable, and yielded more readily to passive motion. The patient could now flex and extend the foot herself somewhat, which, before the massage, it was almost beyond her power to do. At the second visit I added a little resistance to the voluntary flexion and extension of the foot, but this was almost a make-believe, so feeble were her own efforts in moving it. At the third visit the spots which had been painful on pressure could bear vigorous manipulation very comfortably. Henceforth friction, malaxation, passive and actopassive motion, were persisted in half an hour or so daily, and after five massages the patient walked about the house without crutches or any other aid, and did not require the use of them again. After the sixth massage she went up and down stairs naturally, and after the eighth walked half a mile, then eight days from the time this treatment was begun. Four more visits were made on alternate days, and at the last one I tied a handkerchief around the metatarsophalangeal joints (ball of the foot), and to this attached the hook of a spring-balance, the indicator of which was pulled out to eighteen pounds by flexing the foot (contraction of the anterior muscles), which is a severe enough test, as anyone can ascertain if they will take the trouble to try. The patient had had no relapse three years afterwards.

Much of the immobility of the joint in this case seemed to me to be due to moderate tonic spasms of all the muscles of the leg, and I at once succeeded in convincing the patient that it was to a great extent within her power to cultivate the faculty of *voluntarily* relaxing them, so as not to resist the passive motion, which latter was proceeded with gently and tentatively, not forcibly, and with all the leverage afforded by the foot, but being limited by the slightest approach of pain and involuntary resistance, and thus in three or four days there was gained free movement of the joint.

In marked contrast with the condition of tissues observed in the affected limb of the previous case and the effect of massage upon it is the flabby, atonic state of muscles and laxity of joint in the following case. Miss A. had been in a nervous, dyspeptic, half-invalid, loose-jointed condition for sixteen years. To pressure (I ought to say, to touch), either on the spinous processes or on the

muscles on both sides of them, her back was fearfully sensitive. High pressure in school-life was said to have been the cause of this state of affairs. There was no history of uterine trouble nor anything of a hysterical nature about the case. For several years she had been growing flat-footed, for which shoes of such a make as would preserve the arch of the feet were advised. Nine months before I saw her she was walking along an uneven road, her foot slipped, and in the effort to regain her balance, so as to save her back, she made a misstep, twisting her left foot, inward or outward, she could not tell which. The foot swelled to about one-half more than its normal size and the pain was referred mainly to the instep. For five weeks the recumbent position was kept and antiphlogistics used. Her further history up to the time I saw her, eight months after, was one of ups and downs, aches and pains. Suffice it to say that at my first visit I learned that then a walk of a square would lay her up for a week with pain and weakness in the ankle and instep. She walked with a limp, and going up and down stairs was tedious and painful. When reclining, which was most of the time, the foot had a forlorn aspect, drooping forward and inward, and it admitted of too free passive motion in all directions except that of flexion, to which there was a yielding resistance, and this was felt by the patient as a disagreeable stretching sensation, not only in the calf muscles and those on the posterior aspect of the thigh, but also in the muscles of the back, even to the nape of the neck. Along the inner border of the foot pain was said to be constant, and at the articulation of the first metatarsal bone with the cuneiform insertion of the tibialis anticus there was too much mobility.

From six weeks after the injury to the time I was called she had had at various times three manipulators, non-medical people, who handled the leg as if they were afraid of touching it. There seemed to me to be no necessity for extreme gentleness in this case, as it was very evident the limb was now suffering more from impaired nutrition and innervation consequent upon the necessitated disuse than from anything else; so I at once began to give it vigorous manipulation as far as the knee, with brisk passive motion. That such could be done without causing any pain at the time seemed very wonderful to the patient, and no doubt the mental effect of this was good. I then asked the patient to move the foot herself as she was reclining, but it was a pitiful effort, scarcely

visible. Nevertheless I said, "That's first rate. Now move the foot up and down and I will resist both ways." But this at first was a make-believe, for my so-called resisting motion was a simple aiding of the patient's voluntary effort and no resistance at all. The object was to encourage the effort of the will, which in this condition might be one-half or two-thirds what was necessary to do the required movement. Under these procedures the defective will-power and impaired nutrition improved *pari passu*.

After the first *séance* of twenty minutes it was to be expected that such a hyperæsthetic individual would be quite tired out and much worse generally, and such was the case; but I firmly adhered to the theory that the more strength the limb gained the better able would she be to bear her numerous aches, in which she agreed with me. The patient was directed to try to flex and extend the foot a few minutes twice daily when lying down. On the day following the third massage, February 11, 1877, the patient walked without limping any more. From this time onward resistive motion was no longer a make-believe, for it was evident the limb was gaining strength from day to day, so that after a half-dozen visits in eight days she went up and down a long flight of stairs naturally and easily. At the end of ten days, after seven massages, I tied a handkerchief around the ball of the foot (metatarsophalangeal joints) and put one loop of this over the hook of a spring-balance, the indicator of which was pulled out several times to twelve pounds by the upward movement or flexion of the foot. The other foot pulled sixteen pounds in the same manner; this one had also been getting a portion of the same treatment, for it too had suffered somewhat from disuse. In the next four weeks half a dozen more massages were administered, and the foot and ankle gradually increased in strength, so that she could do anything with the limb that her general strength or the state of her back would allow, from going up stairs with an elastic step or walking a half-mile to utter indisposition to move from the couch. The foot and ankle were no longer the weakest parts which had to stand the strain, the muscles of the leg were firmer and stronger, and it seemed as if there were more of an arch to each foot, a result which an improved state of tonicity of all the muscles of the leg and foot, but particularly of the tibialis anticus and peroneus tertius, might tend to produce by supplementing any natural or acquired laxity of

ligaments. Six weeks later the patient wrote to me that "both ankles were certainly stronger than before the accident last spring."

Mrs. W. B., fifty-five years of age, slipped on a curbstone and came down heavily, turning her foot inward. She was in great pain, but managed to hobble home, a distance of twenty rods, with the assistance of two people. Eight days after this she was first seen by me. She had not been able to bear any weight on the ankle since the accident and had worn a rubber bandage. There was great discoloration and swelling, most marked around the outer malleolus and extending half-way up the leg. Absence of pain while the foot was at rest was marked at this time. Massage was given twice daily at first, which made the ankle comfortable and the patient grateful; and after the massage a cotton bandage was applied (with absorbent cotton under it) over the most swollen parts. At the end of eleven days she began to take a few steps, leaning on the back of a chair, having been in preparation for this for a few days by means of passive and resistive motion while lying down. She made daily progress in walking.

But in the meantime the swelling had been unusually slow to decrease, and it was not until the fifteenth day after I first saw her (the twenty-third day after the accident) that it was sufficiently abated so that the outer malleolus could be made out. This was found to be wider and flatter than the other, to spring on pressure, and was very sensitive, but there was no crepitus. Suspecting fracture without displacement, I called to see the late Dr. R. M. Hodges, who then lived quite near to the patient. After my description of the case he thought my diagnosis was correct, and we set a time for consultation. "How much can she use her ankle?" he asked. "Walk about in-doors," I replied. "Then you are doing first rate; keep on; you do not need me." *He was a man; we shall not look upon his like again.*

The patient was kept awake a great deal by the illness of her husband. By and by symptoms of neuritis set in, and she had pain, burning, and tingling, extending from the ankle up the outer aspect of the leg, which was worse at night. This was much relieved by massage as well as by a walk in the evening followed by an alternate hot and cold bath. Her disagreeable symptoms all improved, and at the end of twenty-five days she could go up and down stairs naturally.

Without splints or plaster cast this patient made a good recovery from a sprain with a crack in the external malleolus, and from a subsequent attack of neuritis while under great anxiety and losing much sleep.

I was called to the following case by his physician, Dr. Henry W. Broughton, on November 15, 1894. The patient, Mr. P. F. L., was then eighteen years old, weighed one hundred and forty-two pounds, and was of a highly nervous temperament. Six days before I saw him, while playing ball, he was pushed down and sprained his right knee, but could not tell which way the leg turned. He had been in great discomfort ever since and unable to sleep, though he did not complain of pain so much as restlessness. The leg had been put in a plaster-of-Paris dressing, which he could not tolerate, and this was laid aside for a curved ham-splint. Moderate attempts at flexion or extension, bending the leg in and out, did not cause pain. The range of motion was very slight. Stronger attempts to move it passively, and especially to bend the leg in at the foot and out at the knee, caused pain, which was referred to the outer aspect of the knee and to the insertion of the outer hamstring muscles, from which we inferred that the knee had probably been sprained by the leg turning inward and the knee out, a very unusual way for a sprain to occur. There was much discomfort in the muscles on the outer aspect of the thigh, and pressure on the condyles of the femur caused pain.

We learned that within the previous three months he had given his knee several jerks, so that it was still in an irritable condition when he hurt it this last time. There was much heat and a great deal of effusion, tense and fluctuating, which was most marked above the knee, distending the synovial sac on the front of the femur beneath the tendon of the quadriceps-extensor muscle. Under daily massage and bandaging the effusion went down and the circumferences rapidly decreased, as a few measurements taken from my note-book show:

	Centre Patella.	Above Patella.	Below Patella.
Well knee	14 inches.	13½ inches.	12¾ inches.
November 15, 1894, injured knee	16 inches.	15¾ inches.	13⅞ inches.
After thirty minutes' massage	15¾ inches.	15½ inches.	13¾ inches.
November 18, before massage	15 inches.	15⅛ inches.	13⅛ inches.
November 18, after massage	14⅞ inches.	15 inches.	13 inches.
December 1	14½ inches.	14¼ inches.	12½ inches.

Further decrease of circumference did not take place. Morphia and phenacetine seemed to have no effect in quieting the patient. Large doses of sulphonal succeeded a little better. Three days after massage was begun he rested well without any hypnotics, and by the fourth day the improvement in the knee was so marked in the diminution of the swelling and the feeling of the tissues that pushing the leg against resistance was begun. On the following day he pushed it so vigorously that we allowed him to walk on crutches, which he did, bearing some weight on the lame knee.

December 1.—Had no massage for five days, and was then going about with one cane. Had no pain while walking until he got tired.

December 26.—There was evidently a good deal of induration and thickening on the outer aspect of the thigh above the knee-joint. The margin of what seemed to be the synovial capsule on the outer and anterior aspect of the thigh felt hard and sharply defined, making one think that perhaps there had been a rupture of the vastus externus. But there had been no sudden pain, and he could contract his quadriceps-extensor group, though not strongly.

For the previous eight days he had been going about freely with one cane. The leg would only bend at this time to a right angle, and it could not be freely extended. He then told me, what we had not learned before, that *this was as much motion as it had before it was injured,* and that it had been a troublesome knee for about a year and a half. My suspicions were aroused, and meeting his physician a few days later I suggested to him the possibility of the patient having a sarcoma. Very soon after this he was taken to the City Hospital, where his leg was amputated. It was found that the lower end of the femur had been converted into a large involucrum by a subperiosteal sarcoma, which had burrowed into the medullary canal, leaving an outside shell. A year later he died of sarcoma of the lungs; and history shows that this is too often the sad ending of these cases where no massage has been used.

After the first eight days that I attended this patient massage and bandaging were continued but once or twice a week until December 26. The leg was amputated January 5, 1895. Doubtless the disappearance of the effusion made the diagnosis easier for the surgeons, who had not previously seen the case. One of them thought that this was a case where massage might have been more

honored in the omission than the performance. Possibly. Another who examined the patient told me that massage could not do any harm in such a case. An orthopædic surgeon of large experience who did not know of this case, when asked in the abstract as to the danger of massage accelerating the spread of sarcoma-cells into the general circulation and producing a metastasis of the disease in other organs, expressed himself freely to the effect that it would not make any difference. Where the risk is already so great of diffusion of sarcoma-cells and the reappearance of the disease in some other organ, I think any of us would be willing to run a little more risk if massage or any other treatment would do as well for a sarcomatous limb that had been repeatedly sprained, as this one had been, and give us the use of it again for a few weeks before having it cut off.

From the foregoing the following conclusions would seem to be justifiable:

1. A sprain is a wrench or twist of a joint; a sudden, partial displacement of two articulating joint-surfaces, followed by immediate replacement.

2. The symptoms are pain, swelling, discoloration, and usually heat, with impaired motion.

3. Its diagnosis may be obscured by the swelling, which may conceal a fracture underneath.

4. Whatever will quickly reduce the heat, the pain, the swelling—such as massage, snug bandaging, and elevated position of the joint—would proportionately have made the diagnosis easier before the X-rays were discovered.

5. The means just mentioned are therefore not only valuable for diagnosis, but also for treatment; and their use in many cases of sprains of all degrees of severity shows that they recover in one-third of the time that they require under absolute rest and fixed dressings without massage.

6. Even a sprain of a joint previously weakened by malignant disease may be rapidly ameliorated by massage, and useful motion gained before amputation.

XXII.

Massage in Joint-Affections.—Continued.

COMPARED WITH HEAT AND COLD—THICKENING OF CAPSULES—STIFF JOINTS — HYDRARTHRUS — RELAXATION OF MUSCLES — PERIARTHRITIS OF THE SHOULDER-JOINT — BONE-SETTING, IMPROPERLY SO CALLED—DAL CIN—FRACTURES.

"But Socrates, sitting up in bed, drew up his leg, and rubbed it with his hand, and as he rubbed it said: 'What an unaccountable thing, my friends, that seems to be which men call pleasure, and how wonderfully is it related towards that which appears to be its contrary, pain, in that they will not both be present to a man at the same time, yet if any one pursues and attains the one, he is almost always compelled to receive the other, as if they were both united together from one head. . . . Since I suffered pain in my leg before from the chain, but pleasure seems to have succeeded.'"—PHÆDO.

HEAT and cold have each been used with good results in recent and old joint-affections, sprains, and synovitis. Moderate heat causes a fluxion to the parts to which it is applied, dilates the vessels bringing the circulation, as well as those returning it. If long continued, it causes relaxation, and if of a high temperature, it acts like cold in causing contraction of the vessels and counteracting vasomotor palsy. Hence the plan of immersing a sprain in water at the temperature of 70° F. and gradually increasing it to the extreme point of toleration is excellent as far as it goes. But this is only a slight imitation of what massage does, for the intermittent momentary compression of the stroking and kneading causes a mechanical dilatation and contraction of the vessels (arterial, capillary, venous, and lymphatic) every time it is applied, from sixty times a minute and upward, which is certainly sixty times oftener than could be caused by the variations of caloric in the same time; besides, the aid to the returning circulation, by being pushed along by massage, is much greater than that caused by heat, which tends rather to enlarge the area of stasis; moreover, the pressure of the hand over effusions disperses them more rapidly than heat can do.

If cold be applied to a sprain or synovitis, this is all very well so far as the reduction of heat, pain, and swelling are concerned,

but in place of the seat of injury being flushed and the returning currents hastened, as by massage, the flow of blood is lessened and the outlet to effused products by veins and lymphatics is also rendered more impermeable in consequence of their contraction with all the other tissues that are cooled. Cold applications are not without danger, as they may convert inflammation into gangrene, and a lesser evil is that they may suspend nutritive action and hinder the process of repair to which moderate inflammation is necessary. Moeller has made known to us the result of Bauden's treatment of five hundred sprains by cold water; the average time for recovery was found to be twenty-eight and one-half days, over three times as long as that under massage,* thus:

104 cases recovered under cold water in from 8 to 20 days.
150 cases recovered under cold water in from 20 to 30 days.
110 cases recovered under cold water in from 30 to 40 days.
80 cases recovered under cold water in from 40 to 50 days.
56 cases.....not stated.

Good results have been obtained from the use of massage in affections of joints by Gerst, Wagner, Zabludowski, Faye, Starke, Körner, Huillier, Fontaine, Witt, Estlander, Norström, and others. In five cases of acute serous synovitis Johnsen obtained recovery by massage; in forty-three cases of chronic synovitis he obtained recovery in thirty-four and improvement in nine; in eighty-nine cases of hyperplastic synovitis fifty-five were cured, thirty improved, and four were without change. In fifteen cases of relaxation of joint-capsules recovery resulted from massage in fourteen and improvement in one; in three cases of acute inflammation of the sheaths of the tendons recovery took place, and in six of a chronic nature cure was also obtained. Sprains and contusions of the back from railway injuries or other causes (often erroneously supposed to be complicated with injury to the spinal cord) can also be treated by massage, but not so effectively as the joints of a limb where we can work all around and on every side of them. When acute symptoms have subsided this treatment should always precede attempts at motion. Dr. Herbert W. Page, however, advises motion under these circumstances, no matter how much it may hurt, evidently

* Moeller, Du Massage, Journal de Médecine, Bruxelles, February, March, April, 1877.

unaware of the effects of massage in preparing the way for this, and making it vastly more easy and agreeable.

When joints are lax and muscles flabby, in the absence of acute symptoms, vigorous deep manipulation and percussion, with brisk, active, and resistive movements, followed by a tight bandage, are indicated, but passive motion pushed until there is a feeling of resistance should be avoided. With capsular and periarticular thickening, induration and hyperplasia of an indolent character, kneading with one hand upon the affected structures and stroking with the other above them will play the most important *rôle*, while increasing passive motion will be persisted in. In such instances the removal of a bandage, if the patient has been wearing one, and encouraging active motion can generally be done with safety, and will be regarded by the patient as marked evidence of improvement. As motion is impaired in all sorts of joint-affections, it is well that the muscles on each side of them should be stimulated by massage.

Massage disintegrates newly formed granulation tissue, removes the stasis which it has occasioned, presses the white corpuscles and transuded plasma into the lymph-current, at the same time the newly formed capillaries that feed this granulation tissue are ruptured and undergo retrograde metamorphosis as well as the crushed mass, and thus the formation of connective tissue and the subsequent change of this into cicatricial tissue, which often causes pernicious retraction, is prevented or limited. Hyperplastic tissue firmly organized, solid like India-rubber, and not sensitive, is probably non-vascular, owing to its pressure upon and obliteration of the capillaries which previously nourished it. Upon such tissue it is hardly possible to accomplish anything by massage, though it is considered by Gottlieb, Billroth, and others that by vigorous perseverance impervious blood- and lymph-vessels may be dilated and resorption promoted. Certainly the fibrous thickening of the capsule sometimes met with in chronic serous synovitis, which involves the synovial membrane and perisynovial cellular tissue, must yield but slowly to massage, and still more slowly to time alone.

While in hyperplastic synovitis with connective-tissue thickening of the capsule we would use massage with energy, for the same reason that in trachoma of the conjunctiva various irritants are used to induce congestion, and thereby cause a retrograde meta-

morphosis of the sclerosed tissue, in other more acute, sensitive conditions, such as recent sprains and synovitis, massage would be used with great care and gentleness. In the former case, it is used as an irritant, to create a slight inflammation; in the latter, as a sedative and antiphlogistic in the manner already described. In place of the dry, disconnected details of pathological anatomy that rack a student's brain, we hope that someone will attempt to show more clearly the analogies betwixt similar morbid processes in different parts of the body. In trachoma of the conjunctiva pathological changes occur similar to those found in hyperplastic synovitis. What an advantage it is, by turning up the eyelid, to be able to see unchecked granulations extending into the stroma of the conjunctiva, which later contracts, atrophies, and changes into fibrous cicatricial tissue with obliteration of the blood-vessels!

In highly acute arthritis of any kind, attended with fever or not, massage would not be thought appropriate until the disease had assumed a subacute or chronic form and the fever had abated. Then massage might be used with benefit, provided there was no solution of continuity, true ankylosis, or risk of hastening absorption of inflammatory products or disease-germs pernicious to the system. In disease of bone or cartilage massage would be useless. Further classification at present is unnecessary, as each case must be judged by itself.

A few cases illustrative of the effects of massage in chronic local joint-trouble may now be considered in order.

In 1877 I attended Mrs. A. P., who eight years before had slipped and fallen, contusing and spraining her left knee. Synovitis set in, and the patient felt obliged to travel without rest or medical attention. For a year and a half the joint was painfully swollen, and at the end of this time it was severely flexed, and the patient was greatly run down. She then came under the care of a surgeon, who built her up with rest and tonics, and later cut the hamstring tendons and used extension apparatus, so that, after a while, the patient could go about on crutches with a stiff bent knee. Her general health improved until she became quite well, though she was naturally rather delicate. On examination I found the leg at an angle of one hundred and forty degrees with the plane of the thigh, but with very slight motion in the direction of flexion and extension. On each side of the ligamentum patellæ, in front of

the condyles, and also for several inches above the patella on the femur, there was a firm mass of hyperplastic connective tissue which was greater and firmer in front of the internal condyle than elsewhere. There was no sign of superabundance of fluid in the cavity of the joint. Below the knee the cellular tissue of the leg was indurated and the capillary circulation languid. In October the patient had five massages, with special active and passive motion of bending and extending the knee a little farther than was comfortable, and the result was that the circulation became more active and there was slightly increased freedom in the motion of the joint, with a consciousness of greater strength. The patient was so encouraged that a month later she returned for a longer course of treatment. Massage, with tentative passive motion, was used every other day, and several times daily the patient sat with the well leg resting across the lower end of the femur of the stiff limb, while this was elevated as high as the chair on which she sat. At first, twenty minutes of this was all she could bear, but toleration increased, and at the end of a week the force of extension was increased by placing the leg on one of her crutches, the sole of the instep on the cross-piece for the hand, while the axillary support came under the knee, and the limb was strapped in this position, so that its own weight furnished power for extension by the length of a lever from the hand-piece to the lower end of the crutch, which rested upon the floor. This could only be tolerated for fifteen minutes to begin with; at the end of a week, for half an hour, and then the effect was increased by crossing the well limb over the other. The limb always manifested a good deal of trepidation from forced flexion or extension, the pain of which was referred to the inner and anterior aspect of the joint. Pressure on this spot with the thumb while forcibly extending the limb lessened the pain and gave the patient a feeling of support and security. Hoping to aid in rendering the hyperplastic tissue softer and more vascular, a flaxseed poultice was applied to it every night for a week, but this was followed every morning by a painful lameness in the muscles on the posterior aspect of the thigh, and even affected the glutei. It passed away quickly under massage. In three weeks we applied an ordinary curved hamsplint and bandaged it on firmly. The patient had never worn one of these, and she was delighted, for in walking she could bear more weight upon the knee than she had

been able to do at any time since it had been injured, and she could walk about in-doors without the aid of crutches or anything else. The motion of walking with the splint made a uniform and vigorous extension of the limb, and this was very desirable, for the tibia had a slight appearance as if it were subluxated backward, but this was doubtless more apparent than real by reason of the mass of tissue on the anterior aspect of the joint. In five weeks we had gained one and one-eighth inches extension at the ankle, as shown by an outline, and the thickened tissue had decreased, showing one inch less of circumference above the knee and three-quarters of an inch less below and in front of the condyles, the former circumference being the same as the well knee, the latter still seven-eighths of an inch greater than the same circumference on the other knee. The hamsplint continued to afford great security and comfort in walking. Three weeks later the campaign against the knee was practically at an end on account of the appearance of cough, headache, backache, and pains in the lower part of the abdomen. General massage, rest in bed, light, nutritious food, and tonics soon restored the patient to her customary health, and then she departed for a more genial climate farther south. Nothing more was done for the knee, and she has not yet got rid of her crutches. But there is no loss without some compensation, for the use of crutches in this case, in all probability, strengthened and expanded a somewhat delicate chest as well as imparted tone to the muscles of the abdomen, thus supplementing the work of the uterine ligaments, for there was a history of their relaxation and enlargement of the uterus. With a stronger constitution, massage, movements, and mechanical appliances would have been more successful. We may infer this not only from the history of the case, but also from the result in the following case:

A man, thirty-three years of age, after a contusion of the right knee in 1870, had stiffness and enlargement of the same remaining. On August 15, 1874, he cut himself with an axe in the same knee, causing a penetrating wound of the joint which closed in three weeks; but ankylosis began to form, which without doubt was still membranous, as slight mobility was present. The circumference of the knee over the head of the fibula was thirty-two centimetres, at the lower margin of the patella thirty-eight, at the upper forty, and a little above at the end of the cicatrix thirty-seven (against

30.5, thirty-five, thirty-five, thirty-four centimetres of the well knee). The cartilages and apophyses may also have been involved in the hyperplastic process. After massage for fifteen minutes the circumference of the knee had decreased one centimetre. After five sittings the enlargement had decreased considerably and motion had increased, but the treatment was then interrupted on account of the appearance of furuncles. When these had healed, the condition of the limb in general had considerably improved, but the swelling was much the same. After each massage motion became freer and swelling less, but after a few hours the swelling and stiffness returned. Yet there was gradual improvement, especially when the patient took half an hour's active exercise after the massage. Once more the appearance of furuncles interrupted the treatment. After three months forcible flexion under chloroform was done, and the breaking of adhesions could be distinctly heard. After this flexion was natural. The joint was abundantly *masséed* immediately after the operation. The following day the patient could walk around without hinderance, and after about a week, during which he had daily massage, the circumference of the knee had decreased, but was still larger than the other, and the patient could walk a long distance without limping or getting fatigued. Several months afterwards there was no relapse.* Milder cases than these of chronic hyperplastic joint-trouble yield more readily to massage.

Massage may prove valuable in chronic effusions into the joints, whether painless or painful, whether dependent upon increased secretion or lessened power of absorption. In these cases there is generally thickening of the capsule. Barwell calls attention to the fact, and Billroth expresses himself in like manner, that frequent application of blisters and stimulating embrocations often relax and injure the skin, producing therein a state of chronic congestion, a passive hyperæmia and thickening, similar to the diseased condition they are intended to combat, but which they frequently aggravate. Issues and moxas may inflict similar injury. After acute synovitis and when lingering inflammation has been subdued, Barwell says massage and passive motion should be resorted to in order to promote absorption of new growths. He regards it as very

* Westerlund in Finska läkaresällsk. handl., XVII., 3, October 4, S. 144, 1875.

valuable for superficial joints, as it often restores flexibility and perfect shape to the joint more rapidly than any other means with which he is acquainted.

Mr. L. A., twenty-seven years of age and well built, had suffered from slight effusion into the right knee-joint for five years, which was suddenly converted into a large effusion by a contusion of the knee from a fall while skating eight weeks before he came to me. The effusion had been reduced considerably by means of compression, but still bulged out a good deal on each side of the ligamentum patellæ and on each side of the tendon of the rectus femoris. Motion was natural in all directions except extreme flexion. The knee felt weak and stiff. There was no evidence of acute inflammation and no pain. The case was one of painless effusion within the capsule. In addition to the compression I gave the patient seven massages in three weeks, and the knee steadily improved, the effusion decreased, and the muscles gained in size and firmness. At first there was pain only on pressure at the anterior aspect of both condyles, but this disappeared. After two massages the patient resumed full work all day, engraving, and in the evening walked one mile and a quarter on an icy sidewalk without detriment. Previous to this he was doing but half a day's work and walking only a few squares at a time. For five months he disappeared, and then returned to me much dispirited, with the knee worse than when I last saw him. The effusion was nearly all gone, it is true, but the limb could not be fully extended as before, and there was more stiffness and occasionally crepitus with spontaneous pain. Counterirritants had been freely used in the meantime, and all the tissues from the skin down were hard, stiff, and dry, like sole-leather,—just in the opposite condition from that which massage induces, namely, suppleness and elasticity, while stimulating absorption to a high degree.

Massage has been found to work well in recent cases of hydrarthrus, "water on the knee," but with chronic ones like that just narrated the absorbent vessels are no longer in a normal condition, but are more or less obstructed or over-burdened. It might be prudent to try massage with compression for a while, and if nothing were accomplished, aspiration might be resorted to and then followed by the means that preceded it. Professor J. Nicolaysen (in *Norsk. Mag. f. Lägevidensk.* 3, R. IV., 3, 8, S. 124, 125, 1874) communi-

cates the following cases: A man, thirty-two years of age, had suffered from hydrarthrus for six and one-half years. Repeated puncture and evacuation had always been followed by a reaccumulation of the fluid. Massage was used for several months and the patient returned to his work. There was no relapse as formerly. A man, fifty years of age, had suffered from hydrarthrus of the knee-joint for four months. After the use of massage for seventeen days the collection of fluid in the knee-joint disappeared, but the swelling of the capsule and sensibility of the external condyle continued for a long time. After six weeks' treatment the patient was discharged cured. In another case, where the affection had lasted for ten years, improvement was obtained by means of massage, but the patient left the hospital before treatment was ended with the capsule thickened and the surrounding tissues relaxed. Norström and Professor Gussenbauer have had similar encouraging experience with the use of massage in *hydrops articulorum*. After narrating an exemplary case, Gussenbauer concludes by saying: "I could still tell you, gentlemen, of several more cases of *hydrops genu,* in which by means of compression with sponges and massage this obstinate affection has been perfectly removed, or so much improved that the patients could resume their occupations." In fourteen cases of *hydrops genu,* Zabludowski obtained good results from massage, in recent cases, in from six to eight days; in old ones, in from one week to five months. (See Fig. 53.)

A valuable contribution to this subject is that from the experience of Dr. W. H. Bennett in the London *Lancet* of February 23, 1901. He calls our attention to a quiet, passive effusion into the knee-joint occurring in women and young girls. It is always associated with menstrual irregularity or uterine trouble. It rarely occurs in any other joint than the knee. The joints of the opposite sides are usually involved at the same time, but the effusion is, as a rule, much more marked on one side than on the other. There is scarcely any pain unless some injury has been received. It is most apt to occur either at the time of puberty or at the climacteric. Although the joint may contain considerable fluid, it is never tense except after superadded injury. The common cause of the discovery of the condition is usually a very slight injury. Error in diagnosis can usually be avoided by observing the character of the swelling, the existence of effusion on both sides (that on the unin-

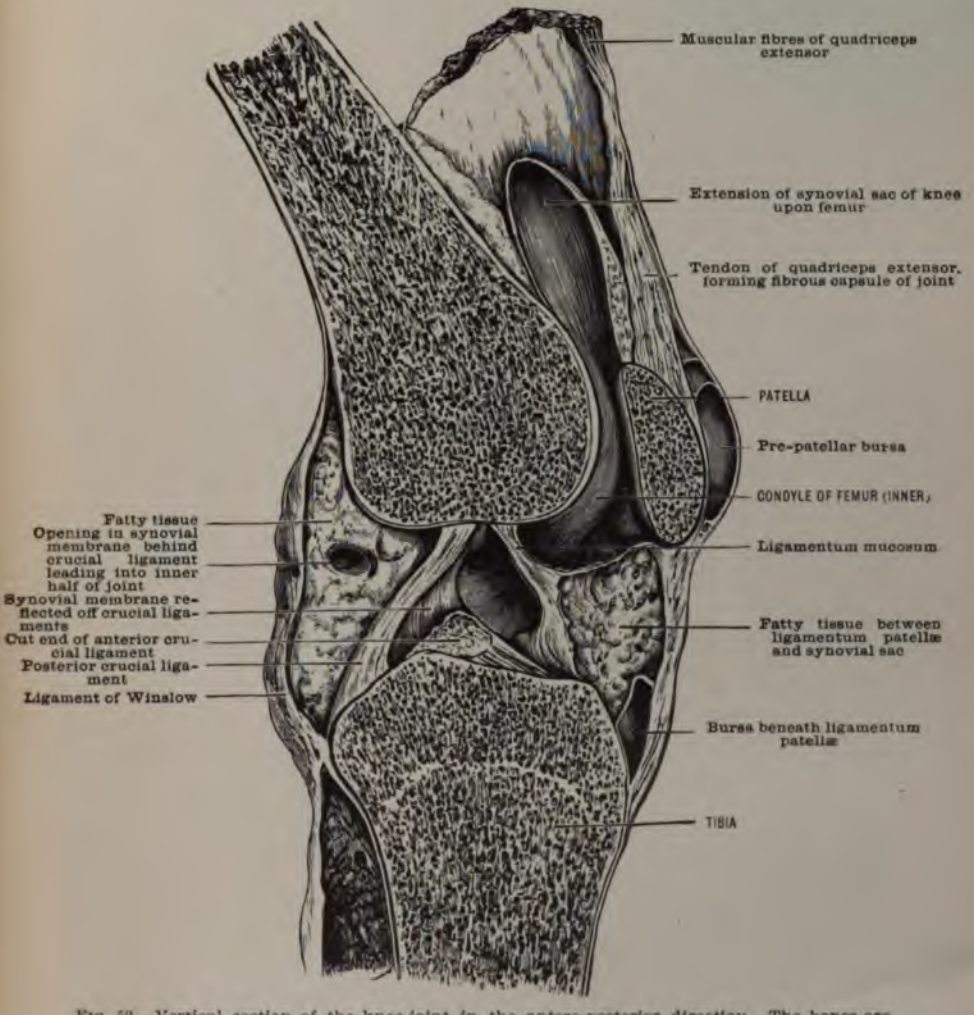

Muscular fibres of quadriceps extensor
Extension of synovial sac of knee upon femur
Tendon of quadriceps extensor, forming fibrous capsule of joint
PATELLA
Pre-patellar bursa
CONDYLE OF FEMUR (INNER)
Ligamentum mucosum
Fatty tissue between ligamentum patellæ and synovial sac
Bursa beneath ligamentum patellæ
TIBIA
Fatty tissue
Opening in synovial membrane behind crucial ligament leading into inner half of joint
Synovial membrane reflected off crucial ligaments
Cut end of anterior crucial ligament
Posterior crucial ligament
Ligament of Winslow

FIG. 53.—Vertical section of the knee-joint in the antero-posterior direction. The bones are somewhat drawn apart. (From Morris's Anatomy.)

jured side being painless and without heat), and the coincidence of menstrual or uterine trouble.

The primary treatment should be directed to the correction of the faulty uterine functions with moderate exercise and massage combined with life out-of-doors. Treatment by splints and absolute rest should be avoided. In the absence of acute symptoms arising from the injury, the condition of the knees ought not to lead to any restriction in the exercise of a person otherwise in ordinary health. Dr. Bennett has seen twenty cases of this affection, and in no case did recovery take place while the uterine irregularities continued. In every case their correction was followed by prompt improvement in the condition of the knee.

Strumous Synovitis.—I fear but few, if any, orthopædic surgeons would now indorse the following opinion of Barwell, expressed in his "Treatise on Diseases of the Joints" forty years ago. And yet if there were truth in it then, there probably is still. In his chapter on "Strumous Synovitis" he says: "We may only be called upon after the patient has suffered for some considerable time; has been kept in bed with perhaps an issue that has been open for six weeks or two months, or possibly with no treatment at all. The joint will probably be found shapeless, swollen, pulpy; perhaps it may be painful; probably, particularly if the knee be in question, it will be a good deal flexed. Now, we shall in nearly all cases find on examination, unless the disease has gone too far, that the whole joint may be manipulated without producing pain, that pressure upon the choice seat of tenderness will cause no expression of suffering, and that no startings or any acute pains disturb the patient's sleep. Even in such a case as this we may in all likelihood cure the patient by first applying strong pressure, manipulations, rubbing, and passive motion. The condition into which the new tissue has fallen is simply a passive one; the material exists, but there is no action in it; perhaps there may have been an abscess which has left a sinus, but the suppuration is very sluggish; the rest of the tissue is doing nothing.

"Now, if the granulations be allowed to remain in this passivity, they may, after some years, contract and consolidate even *in spite of such treatment;* but their more general course is to take on a retrograde action, gradually to yield to suppuration, and to involve the textures of the joint which they inclose. Our object

should be, taking advantage of the passive state, to produce absorption of the jelly-like tissue. The painless condition upon pressure, and particularly of that spot which is the chosen seat of tenderness, is the proof that we may employ not merely pressure and massage, but passive motion; and we can in a great number of instances, even after abscesses have formed, produce absorption of a large portion of the false tissue and consolidation of the rest. I desire to lay powerful stress upon this point of enforcing passive motion as soon as actual inflammation is checked and mere vegetative cell-growth is the only action going on. M. Bonnet, the first writer who attempted to show the value of such means, has not limited its use sufficiently to the cases of which we are now treating. The counter-indications to this treatment are an active condition of the swelling, evidenced by pain and tenderness, any considerable amount of degeneration or suppuration, starting pains, and tenderness of the joint-surfaces." Billroth also recommends massage in torpid cases of *tumor albus*.*

Relaxation of Ligaments.—This is often erroneously diagnosticated after the improvement of a joint from the acute symptoms of disease or injury. It is much more frequently the case that the muscles moving it are atrophied and relaxed in consequence of the necessitated disuse, which thus allows too great traction upon its ligaments. Massage, carefully regulated movements, and faradization will restore the nutrition and tone of such muscles, and if the disturbance of the joint has disappeared, the limb can thus be got well. In three cases of this kind I had the pleasure of training the affected muscles as mentioned, so that from being totally unable to extend the affected leg at all, in a few weeks they could hold it fully and voluntarily extended for seven, nine, and ten minutes respectively. The first of these was a stout, elderly lady, who still had the remains of an old synovitis when she began this treatment, under which she fully recovered. The second was a gentleman of sixty-three years who had developed a rheumatoid arthritis of his left knee in consequence of an injury; and, though the periarticular thickening disappeared and the quadriceps-extensor muscles improved so that he could hold the leg extended for nine minutes, grating of the articular surfaces remained and locomotion was much

* Surgical Pathology, p. 750.

impaired. The third was a long-levered, awkward woman, who had for many years suffered from relaxation of the quadriceps extensor to such an extent that it allowed the patella to slip externally without the power of voluntary or involuntary replacement, causing her many bad falls. She was of large frame and well nourished, but her muscles were flabby and her movements not easy and graceful. At fourteen years of age she fell upon the ice and hurt her left knee, and ever since she has had some trouble with that limb. The history and symptoms showed relaxation of the quadriceps-extensor muscles, allowing the patella to glide externally without the voluntary or involuntary power of immediate replacement, and this would cause the patient to fall, and then she pushed the patella into its place with her hand. The knee was sensitive and easily jarred, but otherwise normal. For relief and prevention of displacement of the knee-pan she wore an elastic envelope with a hole in it into which the patella fitted. Tendon-reflex was normal. When she was lying down she could not raise the limb off the couch with the knee extended, but when someone else elevated it she could hold it so for a few seconds without support. After two sittings of massage, percussion, and assistive movements the patient could raise the leg extended without assistance, and after five visits she could do this easily. Every now and then the patient had massage frequently for a few weeks. Two months after her first visits to me she was in the habit of leaving off her elastic support and not only walking without it, but also going up and down stairs in the dark in the duties of her profession, which was that of a nurse. Here is the record of her visits to me at the end of a year from the first time I saw her. November 25, 1881. After twenty minutes of massage, patient elevated the limb extended at knee and held it so for one and one-half minutes. After ten minutes more of massage, she held the limb out straight for two minutes. November 26. After twenty minutes of massage, limb held up for two minutes; after ten minutes more of massage, for three minutes ten seconds, without much fatigue. November 28. After twenty minutes of massage limb extended and elevated for three minutes ten seconds, and after ten minutes more, for three minutes twenty seconds. Massage on November 30, December 1, 3, and 6, when after twenty minutes of massage, limb was held out and up for four minutes. December 9. Limb extended and elevated for four minutes and

five seconds; December 12, seven minutes. The use of the leg had improved proportionately in every other respect. I would not consent to this patient going without a few turns of a roller-bandage for protection against slipping of the patella. She wrote me a few weeks later that she could hold the leg out straight for ten minutes at a time, for I had advised the continuance of this exercise from the first. If anyone will try to hold his whole leg and thigh thus extended horizontally without support for one minute by his watch, he will appreciate what was accomplished in this case. Previous to her coming to me she had been advised to lie still with the leg on a hamsplint for six months, so as to give the quadriceps extensor a chance to grow shorter. By means of massage her occupation was in no way interfered with, and the natural contractility of the muscles was greatly increased. Relaxation of ligaments is often diagnosticated when the condition is really one of atrophy and relaxation of muscles allowing undue traction upon the ligaments of the joint. If space permitted, I could give further illustrations of this.

Periarthritis of the shoulder-joint, a subacute or chronic inflammation of the subacromial bursa and of the loose areolar tissue under the deltoid, with thickening and the formation of adhesions entangling nerves and tendons, hindering motion, and setting up neuritis while the articular surfaces are in a normal condition, is a very stubborn affection. Surgeons in extensive practice have expressed the opinion to me that it seems to be on the increase of late years. This would seem to indicate an increasing constitutional predisposition to the affection over and above the usual immediate causes: injury, rheumatism, catching cold, or prolonged immobility. Those of traumatic origin do the best under treatment. The main impediment to motion would seem to be the thickening of the walls of the subacromial bursa, which prevents the gliding of the superior extremity of the humerus under the acromion. Besides the muscles being atrophied from disuse, one fact, I think, has been overlooked, that they are frequently in the state known as myositis, tender, sore, and indurated. It is generally agreed that the let-alone treatment of these cases allows them to get worse and favors ankylosis. The most rational plan of treatment consists in the use of massage, passive motion, electricity, and douching. These may be used all at the same time, or one or the other will be more

insisted upon, according to the nature of the case. Massage and passive motion prevent the formation of adhesions and loosen to some extent those that have already formed; therefore in the early stage of this affection they may be both preventive and suffice to bring about recovery. After firm, deep adhesions have been broken up under anæsthesia their re-formation will be in part or wholly prevented by means of massage and the immediate soreness of the tissues around the joint diminished, as in the case of a sprain, for this is really what the healthy tissues have to suffer while the adhesions are being ruptured. This will be more apparent when we call to mind that growth has been going on in these healthy tissues with limited motion, so that some of them are shorter than natural. The full extent of motion and exercise compatible with firm adhesions can only be ascertained and cultivated by means of massage and passive motion, followed by active motion. On this account a course of this sort, preliminary to the operation of breaking up adhesions under anæsthesia, would seem to be commendable, so that muscular fibres that are glued together by lymph might be set free, and so much relaxation gained. While using passive motion without anæsthesia I have usually found that the muscles can be better relaxed and more strain put upon them and the adhesions, and these gradually stretched, by proceeding gently and tentatively rather than by sudden and brisk jerking and pumping, which only make the muscles contract all the more stubbornly in order to protect the parts from pain. In general, the result of the treatment in these cases is far from satisfactory. The mobility of the scapula makes up in great part for the lack of success in restoring motion to the scapulohumeral articulation, and this compensatory mobility can be increased by massage and movements. It is much better to strive to get free passive motion before beginning to develop the strength of the muscles by resistive movements, for if we add increased strength of muscles to deep adhesions we have a worse problem to solve than before.

For warding off the impending stiffness and relieving the pain and swelling that appear in the first stage of periarthritis of the shoulder I believe the value of massage can hardly be overestimated, for in doing this it prevents subsequent mischief that cannot easily be overcome. A physician next door to me fell and injured his shoulder-joint. He called on me the following day. I found

great periarticular swelling, ecchymosis, and pain. At the end of a week, after daily massage, the joint was well, and has continued so ever since, now eight years. Miss M., forty-two years of age, weighing one hundred and fifty-four pounds, fell backward and sideway, striking the posterior aspect of the right shoulder-joint just over the circumflex nerve. The shoulder swelled so that she could not get her dress on, but this decreased to its natural size in about five days. It gave her pain at night, but scarcely any during the day. She came to me two weeks after the accident. The joint was of natural appearance, allowed free passive motion, but there was paresis of the deltoid, so that she could only move the arm voluntarily a few inches from the side. I gave the shoulder massage and faradization, and after the first visit it was more comfortable and allowed her to sleep better. On the third day, at the third visit, after faradization for five minutes she could elevate the whole arm and circumduct it naturally but feebly, and the strength of doing this was increased by massage and percussion, but the increase of power was only retained for about twenty minutes. It gradually increased at and after every visit at which massage, percussion, and electricity were used, until at the end of nineteen days, after fifteen visits, the patient could put up a six-pound dumb-bell, and a week later she had quite recovered. In two weeks after this patient came to me she was free from pain at night and could elevate the arm horizontally before manipulation and electricity. Anxious to test the comparative effects of massage, percussion, and electricity in this case in restoring the power of the deltoid, I repeatedly varied them at different sittings, using one first at one time, another at another, and always got the same results. Five minutes of faradization had a greater effect than five minutes of massage, and one minute of percussion with the ulnar border of the fingers separated had a greater effect than either. The effect of each was increased by being followed by the others. False crepitation * in this joint was very marked before a sitting, but much less afterwards. The patient was well for two weeks and would have continued so, but while heated and perspiring she was exposed to a draught of cold air, which brought pain and stiff-

* This was observed in two cases of every ten mentioned by Duplay. Archives générale de Médecine, November, 1872.

ness in the shoulder. For this she put on a belladonna plaster, which, besides producing symptoms of belladonna poisoning, caused great swelling, irritation, and œdema of the whole arm and hand. When these had passed away it was found that the shoulder-joint had become worse, so much, indeed, that an expert advised motion under ether. This was not consented to, so we used massage, electricity, and passive motion industriously every day for two weeks, repeating the same interesting experiments as before, with the result that in two weeks almost perfect motion was gained, and the joint was then equal to all demands upon it, and no more complaint has been heard from it.

Mr. C. A. had the structures on the anterior aspect of the left shoulder-joint severely stretched by the sail of his yacht changing position, so that the whole weight of his body came suddenly upon them, while the arm was jerked upward and backward. Professor David W. Cheever sent him to me three months after the injury. The patient stated that pain and limitation of motion had been increasing ever since the accident. Under massage and vigorous passive motion he made a good recovery.

Howard Marsh, of St. Bartholomew's Hospital, reports the case of a gentleman who fell from his horse, bruising his arm and dislocating his shoulder. Two months afterwards he came to London with the joint almost stiff. (It had been set immediately after the accident.) The adhesions were broken up, but at the end of a week the joint was as bad as before. The operation was repeated with no better result. He was then told that he would have a stiff shoulder for life. This he did not accept, but consulted another surgeon, who again broke up the adhesions and consigned him immediately to a manipulator, who *masséed* the joint for six weeks, and at the end of this time the stiffness had all disappeared and never again returned. Dr. James J. Putnam in commenting on this case wonders whether what was called the after-treatment ought not to have been the primary treatment, and whether it might not have been effective if applied as thoroughly in the first place.

With regard to the effects of breaking up adhesions under ether in these cases Dr. Putnam thus gives his experience of twelve cases: "Those operated on once and cured or benefited, six in number. Those operated on and not cured, within the time they were under observation, five in number. Those operated on once

or more without benefit but eventually cured by other means, one in number." (Boston *Medical and Surgical Journal,* November 30, 1882.)

Norström reports three cases of periarthritis of the shoulder-joint that were benefited sufficiently by massage to give them full use of the affected arm.

Where motion is very limited in a joint and cannot be increased massage may be continued indefinitely with benefit as a substitute for exercise.

Cases of joint-trouble that give the least response to massage are those where no objective points can be found, though I have had good results from this treatment in neuralgia of the joints after all other methods had come to an end with little or no benefit. Such patients will quickly place more confidence in the physician and his abilities than he does himself if they can only see that he understands their case, and he should make the most of his influence in encouraging gradually increased exercise, a most valuable preliminary and concomitant of which is massage. Rubbing by an automaton in such cases is useless,—intelligence and will must go with it.

A patient with an old joint-malady often goes to a *bone-setter,* as he is popularly called. No matter whether the joint be stiff or lax, enlarged or of normal size, the diagnosis is at once made that a bone is out. The patient looks sceptical, but the bone-setter does not care whether the patient believes him or not, he is confident that he can cure the joint all the same, and so assures his patient. Allowed to proceed, a sudden movement or two accompanied by a snap convinces the patient that the bone-setter was right, who tells him that was the noise of the bone going back to its place. He is told to use the limb and leave off his supports. This is attempted, and if successful, then it appears as if a miracle had been performed, and the patient lets everybody know of it; but if not successful, or if the patient has been made worse, which is often the case, then be sure said patient keeps very silent on the subject.

A sudden movement of any joint, healthy or diseased, will usually cause it to snap; and if there be old adhesions, this is an excellent procedure. But the noise of adhesions giving way is different from that caused by a bone slipping in or out of place. Dr. Wharton P. Hood has described the method of bone-setters in his

book, "On Bone-Setting, So-Called." But he makes these procedures applicable to too great a variety of cases. Hood states that the cases which bone-setters benefit by breaking adhesions are those of joints in which there is a slight degree of mobility checked by pain, a spot tender on pressure, and an absence of acute disease. These symptoms are also found in joints in which there are no adhesions, for an increased involuntary tension of the muscles occurs in joints that are injured or diseased which the force of habit often causes to continue after the joint is well. This involuntary tension keeps the joint in an irritable condition and limits passive motion, hence the above symptoms. In some cases it is sufficient to explain to the patients that they may relax their muscles by repeated voluntary effort; in others massage with gentle, persuasive, passive motion will greatly aid recovery. Later, to strengthen the muscles and to teach the patient how to use them, gradually increasing resistive motion is of value. It is a mistake to suppose that violent rubbing is of use in such cases; it begets reflex contraction of the muscles, increasing the evil it is intended to remedy, and causes an intense hyperæmia and hyperæsthesia of the skin, besides chafing it. To avoid the last objection and to conceal the manipulator's ignorance, oily substances are made use of.

I have used vigorous passive motion in several cases, notably in three cases of stiff ankles resulting from fractures of the lower end of the tibia extending into the ankle-joint. The adhesions were heard and felt breaking, the pain was momentary, and two of the cases could walk immediately after without crutches, the freedom of motion in the joint being doubled. Another walked lame without any support before I saw the case. Though some adhesions were broken, but little increase of motion was gained; the improvement in walking and in going up and down stairs was much greater than one would have thought possible from the slight increase of motion in the joint. In this last case adhesions within and without the sheaths of the tendons may have been loosened by the accompanying use of massage. In such cases excellent measures preliminary to the breaking of the adhesions are a warm bath followed by the soothing influence of gentle stroking of the joint and limb and by deep manipulation (without slipping of the fingers), which has a decidedly anæsthetic effect. Gentle tentative passive motion may then be tried, so as to judge of the state of the joint and the amount

of force to be employed. After the violent passive motion, deep kneading and a tolerably tight bandage increase the patient's comfort. When necessary, repetitions of these efforts are better tolerated than the first in suitable cases.

Hood to the contrary, violent passive motion would not be appropriate for recent sprains and seldom for rheumatic and gouty joints.

"Bone-Setting."—Some years ago the Italian peasant woman, Regina Dal Cin, visited this country, and by reducing dislocations that never existed made a great reputation among those who knew nothing about such matters. One physician went so far as to give her credit for doing massage well, but neither he nor she have ever given any proof that they knew anything about massage. A patient of mine, well advanced in years, slipped off the curbstone and came down *"kerchunk,"* stretching the arch of her foot beyond its natural limits. Massage, tight bandaging, and a stiff sole had been of great service to her, so that she could finally walk about, but not so easily as before her mishap. Fond of indulging in *advanced notions,* and pitying the bigotry of the regular physicians, she sent for Dal Cin, who, supposing the patient could not walk at all, at once set to work to make her do so by pulling away at the great toe and pushing at the inner part of the sole. After a little while spent in this manner she asked her interpreter to tell the patient that the ligament leading from the great toe to the heel (!) had been out of place, but she had put it back again so that the patient would be able to walk. The patient got up and walked forthwith, to the joy and astonishment of Dal Cin and her interpreter. Observing their emotion, the patient coolly told them she could walk just as well before Dal Cin came.

Another patient recovering from hip-disease, whose limbs were of equal length, went to Dal Cin and had the joint set. It had never been out of place. The reputation she gained among *"advanced thinkers"* by this case was astounding. The boy repeatedly showed me that he could walk without his cane before he went to her. The report was that he could not.

In a letter from Vienna, published in the Boston *Medical and Surgical Journal* of February 1, 1872, by Dr. James R. Chadwick, an interesting account is given of Dal Cin, which is as follows: "For a year or more she has been moving about from village to

village and town to town of Northern Italy, Hungary, and Austria, claiming to effect by certain manipulations a perfect cure in all cases of dislocation of the hip-joint and such-like diseases. The number of those treated by her with perfect success is said to have been many thousands. At last, two months ago, she ventured into Vienna and began to ply her trade, and soon acquired such renown that a commission * from the medical faculty was appointed to investigate her claims to be admitted to practice in that city—a privilege granted only to those who had proved themselves fully qualified. The four cases seen by the committee, in all of which the head of the femur could be unmistakably felt in the acetabulum, were all pronounced by Dal Cin to be dislocations, which she would proceed to reduce. To effect this she first placed the patient so as to show the greatest possible deformity,† then seized the limb and made several painless and apparently complicated motions without fixing the pelvis, and afterwards, by means of the shortened limb, drew down that side of the pelvis, laid the feet together, and held them so, while she showed to the astonished public that the soles were side by side and that the limbs appeared to be of equal length.‡ In order not to be detected while preparing the bandage, she bent the knee of the long leg and placed the foot across the back of the other. A bandage of tow and white of eggs was applied to the thigh with an external splint. The patient was then ordered to remain in bed and not remove the dressing for a month. The reduction being announced as perfect, the physicians proceeded to measure the limbs, with the result that in none of the cases was the slightest change in length, position, or mobility discovered. After these experiences and proved facts the commission felt themselves justified in publishing the following statements:

"'1. The Frau Dal Cin has not the most superficial conception of a dislocation or the means of its reduction. In one case she called the great trochanter the head of the femur.

* Having the curiosity to see whom this committee was composed of, I looked in the Allgemeine medicinische Wochenschrift, and in No. 47, 1871, I found them to be Professor Weinlechner, Dr. Nusser, city physician, and two physicians-in-chief from one of the public hospitals, Drs. Lorinser and Mosetig.—D. G.

† Any well person may be so placed.—D. G.

‡ A patient can easily be placed so that a short leg will appear as long as the other.—D. G.

"'2. The attempted operation consists in irregular, changeabl painless passive motion, insufficient to reduce a dislocation stretch a contraction.

"'3. The success of these painless motions was in every ca *nil*.

"'4. Inasmuch as Dal Cin, after the so-called reduction, mak use of certain manœuvres with the object of deceiving as to t comparative length of the limbs, it follows that she is fully cogn zant of the deception, and that she is, in the true sense of the wor a female swindler.'

"As a result of this report she has been forbidden the city, ar driven to practise among more credulous folk."

The people of Vienna were certainly credulous enough befo the proceedings were investigated.

Mr. Howard Marsh, who is greatly in favor of forcible mov ments for loosening adhesions in suitable cases, shows the danger incurred by employing bone-setters.

A patient, sixty years of age, with malignant disease of th pelvis, which had caused plugging of the iliac veins and pressur on the sacral plexus, was told that his hip was out. The joint wa said to be "put in" by wrenching, a form of treatment whic greatly increased his suffering.

A patient with a large sarcoma of the muscles of the thig just above the knee was told that the knee was out and must b put in. Arrangements were made for the operation, but, fortu nately, other advice was taken and the proceeding was declined.

In a case of far-advanced angular curvature of the dorsal spin in a little girl the "bunions of the back" were said to be out. Th treatment adopted terminated in the child's death.*

The less people know, the greater is their faith, and hence th greater is their enthusiasm, which is so necessary to convince an carry along others. The most learned people outside of medicin are the most easily gulled because they presume to know wha they do not know, and one person is as good as another wit them. Childlike simplicity, good-natured enthusiasm, and un bounded sympathy are the three prerequisites of a successful mag netizer; the first and the mysteriousness of their doing

* St. Bartholomew's Hospital Reports, Vol. XIV, 1878.

making a deep impression on their patrons, all other attributes are added unto them. What is testimony worth under such circumstances?

MASSAGE IN FRACTURES.—The use of massage in the treatment of recent fractures finds an earnest advocate in Dr. William H. Bennett,* of St. George's Hospital, London, who has had practical experience of its benefits in a number of cases. This method has not received the general attention in England which it deserves, owing to the traditional belief in the necessity for complete rest and immobility. Massage in ordinary cases of fracture can be used without producing any movement between the ends of the bones worth mentioning, but the question is very appropriately raised whether slight movement between the fragments is not conducive to union rather than the reverse, in view of the fact that in many cases of fractures in which the union is slow consolidation rapidly takes place when some mobility between the ends of the bones is brought about by the use of the limb or by passive motion. Broken ribs are subject to continuous motion and yet heal quickly.

The stiffness and pain which follow in many of these cases are often erroneously attributed to adhesions in or about the joint, but Dr. Bennett believes that these are practically always due to matting of the soft tissues about the line of fracture, and the opportunity of dissecting a case forcibly confirms this belief. It was one of fracture of both bones of the leg three inches above the ankle, two months previously. The fractured parts were firmly united and the position of the fragments fairly good. No movement beyond a little springing of the ankle-joint could be produced by force sufficient to break down joints. The ankle-joint was healthy and the stiffness was entirely due to the state of the soft parts about the fracture. The anterior tibial muscle at the point of junction with its tendon was firmly adherent to the bone; the muscular structures at the posterior aspect of the fracture had apparently been slightly torn and were with their tendons intimately adherent to the bone by cicatricial tissue, in which the posterior tibial nerve was involved and could be liberated only by careful dissection; the nerve showed no signs of having been damaged at the time of the accident. All movements of the ankle-joint beyond that allowed

* Lancet, February 5, 1898, page 359.

which the soft parts are prevented from becoming adherent, may appear objectionable, since in many cases the parts must be more or less torn. Early movement might seem likely to produce weakness, but in practice no defect of this nature appears to be brought about when ordinary care is observed. If some weakness should arise, it would be far less detrimental than the crippling which ensues on matting of the torn structures.

The difficulties connected with the application of this treatment are: 1. The large amount of time required of the practitioner in the earlier stages, during which the treatment must be carried out under his immediate supervision unless a particularly skilled person is available. 2. The difficulty of finding in all places a person capable of safely undertaking the manipulations in the later stages, which would absorb more time than busy practitioners could afford, besides other minor difficulties not worth mentioning, such as expense, etc.

Reference to the surgical uses of massage would not be complete without mentioning that in incomplete or soft union of fractures, when a fixed dressing has not brought about consolidation in due time, it is considered good practice to resort to friction of the fractured ends against each other, either by allowing the patient to walk a little or by deliberate manipulation in the hands of the surgeon. This induces a condition similar to that which occurs at first in an ordinary fracture, and success will be more likely to accompany the renewal of a fixed dressing. But when this and other methods fail, such as subcutaneous puncture, injection of irritating fluids, wiring, etc., or are objectionable on account of the fracture being in the vicinity of a joint, percussion over the fracture has been employed with brilliant results. This method has proved to be both safe and effectual. It is done with a metallic mallet faced with India-rubber for five or ten minutes at a time, once in forty-eight hours or so, until pain, heat, and swelling show that active hyperæmia and a renewal of the reparative process have set in. It is not applicable to all cases, but to those of non-union, where the ends of the bones are in apposition and no interval of deficiency nor any tissue intervenes between them. It has been used successfully in cases of fibrous union when absorption and attenuation of the fragments or eburnation had not occurred, and when there was no constitutional dyscrasia. Dr. H. O. Thomas, of

Liverpool, is said to have been the first to have employed
method.*

In intra- and para-articular fractures MM. Lucas-Champ
nière, Tripier, and Rafin have found that immobilization is ac
panied with certain dangers, whereas massage acts well from
first and can be used with other means. The dangers of immo
zation are stiffness of the joints, atrophy of the muscles, and
ischæmia of the muscles caused by the pressure of fixed dress
may be mistaken for neuritis. The advantages of massage
that it promotes absorption of effused products, prevents stiff
of the joints and atrophy of the muscles, and favors repair. It
not delay the period of consolidation, and where this is possibl
has hastened union in many cases. Massage should be used
or twice daily. M. Championnière found that its employment
lieved pain, as most observers do, but M. Rafin found that its ap
cation was painful. The manner of doing the massage wo
probably account for the difference. Good recoveries were obtai
by each. Cases in which there was no displacement did well un
massage and passive motion without immobilization. Those
which there was displacement of the fracture had massage fo
few days at first to hasten absorption, then a retentive dressing
the briefest period possible to make sure that the displacem
would not return, and after this massage and passive motion
the restoration of mobility. As soon as consolidation had tak
place there was free and easy motion, a concurrence not su
ciently emphasized by our observers in their otherwise excell
remarks, to which it is impossible to do justice here. Of the ca
recorded by M. Rafin † recovery took place in three of fracture
the fibula in thirteen, twenty-two, and thirteen days respectivel
in two, of the radius, in nineteen and twenty days respectively;
a double fracture of the ulna, in twenty-seven days; in a fract
of the external condyle of the humerus, extending into the joint,
a child, in nine days; in one case of fracture of both malleoli i
child, in fifteen days; in one case of fracture of both malleoli w
subluxation of the foot outward and backward, in forty days. F

* Braithwait's Retrospect, 1876, New York Medical Journal, February
1886.

† Lyon Médical, March 18, April 1, 8, 15, 1888.

men would have had the hardihood or the patience to use massage in a case like the last until consolidation had occurred.

Even when good union has been obtained of transverse fracture of the patella by means of immobilization, or by suturing the fragments, or by fixation of them with Malgaigne's hooks, the resulting stiffness of the knee-joint, atrophy of the quadriceps extensor, and impaired motion may cast a shadow over the most careful treatment or the most skilful operation. But the lesson taught by cases in which the fragments have remained widely separated and yet accompanied by excellent motion has not passed unheeded, for Professor Tilanus, of Amsterdam, treats cases of fracture of the patella without immobilization, using instead compression, massage, and early movements of the joint, leaving consolidation to take care of itself. By this means the effusion is quickly dispelled and atrophy and stiffness prevented. The patients are encouraged to walk after the first week. In six cases that Professor Tilanus treated this way the patients could walk very well in fourteen days. In one case that M. Rafin treated there was excellent motion in forty-two days, the patient walking perfectly and experiencing slight difficulty only in descending stairs. The seat of the fracture could then be felt with difficulty, being marked by a slight depression of the skin, and the leg could be flexed within two finger-widths of the thigh.*

Dr. Wagner, a regimental surgeon in the Austrian army, obtained astonishingly good results in five cases of fractured patella, which he treated with massage, active and passive movements, but without the application of a bandage. His method was as follows: The patient is put to bed and the affected limb stretched on a simple inclined plane or an adjustable wooden splint in such a way that the heel is elevated. For the first three or four days an ice-bag is placed on the swollen and painful knee. As early as the fourth day massage may be begun, not only over the entire extent of the quadriceps muscle, but also over a large portion of the knee-joint. This is done daily and soon followed by passive movements. As soon as possible without causing great pain the patient himself begins to move the joint, and after the lapse of fourteen or twenty

* *Vide* the very instructive article of M. Rafin in the Lyon Médical, September 5, 1886.

days may attempt to walk on crutches, and in six weeks is usually able to walk without support. Should the fragments be widely separated Wagner recommends subcutaneous suture; but even here massage and gymnastics cannot be begun too early.*

It is worthy of note that the principal muscles of the quadriceps extensor that effect extension of the leg are the vastus internus and vastus externus. The insertion of these on the lateral aspects of the patella is much lower than is generally supposed, and affords leverage to extend the leg when an upper fragment of the patella is detached. Rupture of the rectus femoris alone has little or no influence in hindering walking.

When the knee-joint is healthy even total extirpation of the patella impairs its motion but very slightly, and that only in a relatively weakened power of extension of the leg. Dr. Kummer, of Geneva, has reported several cases illustrative of this.

After union of any solution of continuity, whether of bone, muscle, or nerve, massage and movements are in order; and even while repair is going on the mobility of the joints may be made still more secure by altering the position of them at each dressing.

M. Marevéry in an article in *L'Union Médicale,* February, 1889, on fracture of the fibula treated by massage and mobilization, says that almost all of his patients treated in this way recovered the use of their limbs in less than nineteen days after the injury. At that time he considered that this treatment could be used only for certain kinds of fractures, such as those of the inferior extremity of the radius and of the inferior extremity of the fibula. Cold applications and a rubber bandage were also employed, as well as the massage from the first, and passive motion was given to the joints early.

* Wagner, V., in Deutsche medicinische Zeitung, February 6, 1888.

XXIII.

Massage, Movements, and Bandaging in the Treatment of Displaced Semilunar Cartilages of the Knee-Joint.

. . . "The whole body fitly joined together and compacted by that which every joint supplieth, according to the effectual working in the measure of every part, making increase of the body unto the edifying of itself."—*Ephesians* iv. 16.

It would seem as if nature had been somewhat negligent of her work in placing a couple of *buffers* between each knee-joint that are so easily displaced as the semilunar cartilages seem to be in some people. Many of us have doubtless supposed that these cartilages are firmly attached by their under surfaces to the head of the tibia, and this has but deepened the mystery of their displacement. It may be worth while to review briefly their anatomy and physiology, which must have become exceedingly rusty to many of us since our student days.*

Situated on the head of the tibia and covering the outer two-thirds of the corresponding articular surfaces, held in place by their attachments in front and behind the spine of the tibia, and further fortified by the coronary ligaments in front, the internal lateral ligament on the inside, and by the popliteus muscle on the outside, it would seem almost impossible for the semilunar cartilages ever to slip out of place. Concave on their upper surfaces for adaptation to the condyles of the femur so as to facilitate flexion and extension, and lined by synovial membrane, not only above, but (what some recent writers seem to have forgotten with the rest of us) also on their under surfaces as well, in order to permit rotation between them and the head of the tibia, the complexity of this joint strikes us as something wonderful, even though we have been used to it all our lives. Morris gives us by far the best description of these cartilages that I have yet been able to find: "They lessen the shock and jar of walking, running, and jumping; they fill in the intervals between the articular surfaces of the femur and tibia,

* Dr. Oliver Wendell Holmes used to say that he would not like to be examined on the muscles of the back in summer-time.

which during extension are slight, but during flexion are considerable; they deepen the facets of the tibia for the condyles, and for this purpose they are less fixed at their fore part than behind, so as to be able to close in upon the spherical portions of the condyles in flexion and to slide forward and be squeezed out *into large circles* by the anterior, nearly flat portions of the condyle in extension. This adjustment of the fibro-cartilages to the condyles of the femur in the varying positions of the joint is due partly to their own tendency to shift, partly to their connections, and partly to the pressure and pull of surrounding parts. In flexion and extension the cartilages move with the tibia upon the femur. In supination and pronation the tibia moves upon them while they remain unaltered in their position to the femur; the outer cartilage is steadied chiefly by the pressure of the popliteus (the muscle chiefly concerned in rotating the tibia inward or pronating the leg) against the outer margin of the cartilage while it is acting upon the tibia." *

I fear that it requires a more brilliant imagination and delicate touch than most of us are possessed of to appreciate "the large circles" that the semilunar cartilages are squeezed into by extension, as well as to realize the statement of Dr. Scott Lang, that "in a perfectly sound knee the internal semilunar cartilage can be distinctly felt to recede when the knee is flexed and to come forward in extension on the antero-internal aspect of the joint." Even when all the indications point to displacement of semilunar cartilages, oftener than not these cartilages cannot be felt, as in the three following cases, which were evidently due to dislocation of the internal semilunar cartilage:

On April 12, 1886, Mr. C. came to me. He was twenty years old, thin, wiry, and muscular, but somewhat loose-jointed. Two years before this, when jumping, he said, "he put his right knee out of joint," but kept walking about upon it, though it pained him much for several weeks. Twice afterwards he did the same injury to it, though less severely, and he had had several "kinks" besides. Three days before he came to me he had twisted it as badly as at first, and he was obliged to walk on tiptoe with knee semiflexed. The day after the accident he went to one of our large hospitals, where he was told that a cartilage was out, and he was worked over

* Anatomy of Joints, by Henry Morris, London.

for a while with a view to getting it back, but without avail. He came away from the hospital with the knee enveloped in cotton batting and a bandage over this, and continued to hobble as before. The pain was referred to the inner aspect of the knee, which was tender on pressure, and any attempt to extend the leg increased the pain. The tissues around the knee seemed relaxed, but there was no effusion or swelling, and undue projection of the internal semilunar cartilage could not be made out, though the symptoms all pointed to such an injury. Flexion caused no pain, and while the leg was flexed I pressed firmly with my thumb over the painful spot and extended the leg quickly, and repeated this a few times, with the result of getting the leg extended. This procedure was somewhat painful, but by allowing him to rest a few minutes while using massage and then repeating the same movements of extension the pain decreased. Then I pushed strongly with the heels of my hands over the natural depressions in front of the knee-joint whilst the leg was flexed, and told him to extend it vigorously. After this, free and gentle passive motion was used and well tolerated. Placing a pad formed by a few folds of bandage over the inner aspect of the knee, I applied a bandage firmly over this and around the knee, and the patient walked off almost naturally with but a slight limp half an hour after he came to me. In standing he could not fully extend the leg, but it was as straight as a leg is required to be for walking. He returned the following day and I gave the knee massage and gentle passive motion, while exerting pressure over the inner aspect of the joint. I applied a splint to the back of the leg and thigh, but he soon returned with it, saying that the bandage and pad alone were much more comfortable and supporting. I have not seen him since, but I have been told by his friends that he has not had any return of his mishap. No doubt he was a little lame after I saw him.

Miss A. was nineteen years old and weighed one hundred and thirty pounds when she came to me in June, 1894. Ten months before this she had been running down hill where the ground was rough, and suddenly she felt something slip on the inside of her right knee. The pain was momentary and she managed to walk home with difficulty—a mile and a half. Two weeks after this it slipped again; the leg was semiflexed, and her physician did not succeed in getting it extended. He kept it in a splint for a fort-

night and gradually straightened it. After this it seemed well for several days, but soon slipped again going down stairs, and she did not step with it for four weeks. She then went to New York and consulted an orthopædic surgeon, who put it in plaster-of-Paris for three weeks and after this in a metallic brace, which did not seem to fit very well, for she wore it only for two days. After this another slip, followed by effusion and a lay-up for ten days. The swelling soon disappeared. She has had several more slips since, some of them on slight provocation, as when sitting with the lame leg partly crossed over the other below the knee and allowing it to roll outward by its own weight, which would cause the disturbance to reappear. She has always distinctly felt something slipping out at the inner aspect of the knee when she has made a misstep or done anything to twist the leg out. Latterly, by keeping quiet for five minutes or so she could sometimes feel it slip back; at other times she could only infer that it had gone into place because she felt that she could use it, though it was a little lame and sore for a day or two after. Five weeks before she came to me she stubbed her toe and had a more severe relapse than usual. She had worn a plaster cast almost continuously for seven or eight months, removing it occasionally indoors. She was much discouraged and in despair of ever being able to lay aside entirely the plaster cast.

On examination I found slight periarticular thickening on each side of the ligamentum patellæ, but no effusion in the joint. Passively rotating the leg outward caused discomfort on the inside of the knee, but inward rotation did not. Extension was natural; flexion but one-fourth natural, and on attempting to bend it further pain was produced at the anterior aspect of the internal condyle. No undue projection of the internal semilunar cartilage could be made out. Though this patient and her relatives were of the highest intelligence, yet none of the physicians who had seen the case vouchsafed to tell them what they thought was the matter with the knee, which must have been sufficiently evident from the history alone. The whole leg was smaller than the other, as shown by the following circumferences: right knee, 13 inches; left, $13\frac{3}{4}$; above knee, right, $12\frac{1}{2}$ inches; left, $14\frac{1}{4}$; below knee, right, $12\frac{1}{4}$ inches; left, $12\frac{1}{2}$; right calf, $12\frac{1}{2}$ inches; left, $12\frac{7}{8}$; right thigh, $17\frac{1}{4}$ inches; left, $18\frac{7}{8}$.

Restrained muscular action, disuse, and the pressure of the cast

accounted in great part for the smaller size of the right leg, though it might always have been somewhat smaller than the other. Extra use of the left leg probably made it larger. But notwithstanding the apparent atrophy of the quadriceps-extensor muscle she could hold the leg extended for twenty-five seconds, and this was immediately seized upon as an exercise to strengthen these muscles; and with this object in view she was advised to extend the leg six times three times daily, and to increase this once daily. The whole limb was *masséed* daily, and more especially the muscles of the thigh; faradism was applied to the quadriceps extensor, flexion was gradually increased, while firm pressure was made over the inner aspect of the knee, and after these a bandage was firmly applied around the knee and over a pad on the inside. Even after the first sitting of this kind the knee and whole limb felt much invigorated, and after the second the plaster cast was laid aside entirely, as the knee felt much better supported by the pad and bandage, which had never been applied by anyone else before, and which gave greater feeling of security and allowed more freedom of motion than anything that had been applied. In four days the feeling of stiffness had disappeared and the leg could be bent to a right angle. The knee continued to gain in strength, move easier, and feel more comfortable. In eleven days she could hold the leg extended one minute and a half; in thirteen days, two minutes and ten seconds; and later she could hold it for four minutes, with corresponding improvements in other respects. In order to improve flexion she was told to hold on to the mantel-shelf and get into a squatting position three or four times a day. To prevent a repetition of her accident she was advised to walk with the knee extended and toes turned out, so that the muscles would not be caught off guard, and very soon after she began walking this way a *lummox* of a man stumbled against the inside of the great toe of the leg in question, but without doing any harm to the knee. With the hope of further strengthening the tissues on the inside of the knee and thigh we tried resisting adduction of the thigh with the knee semiflexed; but the sensations produced quickly made us aware that we were on the wrong track, even though my hand pressed firmly over the inner aspect of the knee as she moved it inward. This is the motion that throws the internal semilunar cartilage out.

More recently I have discovered that by standing on the side

of the patient opposite to that of the offending internal semilunar cartilage, and by pressing with the heel of the hand on the inner aspect of the knee, the patient can do adduction with safety and advantage.

Under daily treatment for four weeks the knee improved and felt strong all the time, and she was encouraged to walk, toes out, indoors without the bandage. She then went to the seashore, and visited me two or three times a week for the next five weeks. I allowed her to go bathing and swimming with a rubber bandage on as a precaution. At the seashore she had to go up and down two flights of stairs on foot, and this seemed to improve the bending of the knee, so that it bent past a right angle, and soon she was able to run on the beach, to dance, and to go down stairs naturally, though not easily, which is the most difficult exercise for weak, lame knees. Ten days before she passed from my care we feared that our labors had been brought to naught, for while she was sitting on a trunk the lid suddenly slipped closer. In her alarm she jerked the leg violently and the old feeling returned, as if something were out of place. She pressed firmly over the inside of the knee and extended it, as I had previously shown her how to do in the event of a relapse, but without improvement. She could not fully extend it. She applied the pad and bandage tightly and this gave relief. It was lame and uncomfortable for only a day after, and this might be interpreted as evidence of more rapid recuperative power. Three days afterwards it could be flexed farther and easier than before the accident on the trunk, and it also allowed full extension. This was probably due to rupture of adhesions which we had been more slowly and safely trying to accomplish. A week later, under massage, bandaging, and electricity, she had more than regained what she lost by the last mishap, so that flexion was almost natural, but descending stairs was still a little irksome.

Two months later she wrote me that she was walking three miles a day and riding horseback with an ordinary saddle, a position that would seem unfavorable for the right knee. She had not worn the bandage for a month, and the knee felt strong without it. She could run down stairs and the stiffness had all disappeared. Three months after this I heard from her again, that she could walk, dance, and ride a bicycle without any trouble, and wanted to know if she might skate, to which I replied, " Yes."

Mr. C. E., fifty-two years old; weighs one hundred and ninety pounds; is strong and athletic, and has no surplus fat. Three weeks before he came to me, on September 12, 1894, his right foot caught in a croquet-wicket and he hurt his knee. It was semiflexed and painful, and attempts to straighten it were not successful. His physician did it up in plaster-of-Paris for three or four days, and after that he hobbled about with it partly flexed. Slight, unexpected eversion of his foot had often thrown something out at the inside of his right knee, and this had frequently occurred in bed. But he had always been able to twist and extend the leg himself in such a way that he could feel it slip back again, until this last time. The knee had bothered him in this way for ten years.

On examination there were found slight effusion and heat and some periarticular thickening, and the muscles on the front of the thigh were soft and flabby, as compared with the same muscles of the other thigh. No projecting cartilage could be felt. Massage and snug bandaging with a pad over the inside of the knee, passive motion with firm pressure over the seat of the internal semilunar cartilage every day for a few days, and later every other day, with home exercises of extension and flexion, and in two weeks he had good use of the knee and could go up and down stairs, and in two weeks more he had resumed riding his bicycle.

These cases were delightfully surprised at the comfort and support of a bandage with a pad under it, in comparison with the discomfort and lack of support of splints and plaster casts.

I do not know whether this case was one of displacement of the external semilunar cartilage or not. The manner in which the accident occurred and the previous history would lead one to think that it might have been. It was that of Miss H., eighty-one years of age, well preserved, of medium stature, who looked to be not more than sixty, and who had never been sick a day in her life. Ten days before I was called to her, while she was ringing her door-bell, which was on the left of the door and pulled hard, she lost her balance and swayed around to the left. Her left knee had since been swollen and motion difficult. The knee was weak and stiff, bowed outward, and foot turned inward, and she walked with the aid of a crutch, sliding the foot along the floor. She could not go up or down stairs. No effusion could be made out in the cavity of the knee-joint itself, but there was much effusion above the joint,

bulging out on each side of the tendon of the rectus femoris. Evidently the synovial bursa beneath the quadriceps extensor was shut off from the cavity of the joint, as is sometimes the case. On placing a thumb and finger on each side of the ligamentum patellæ while moving the leg there was a feeling and sound as of dry, creaking leather, not perceptible in the other knee. In the previous twelve or fifteen years her left leg had been gradually changing its outline, so that it bowed out at the knee and in at the foot, but without any discomfort. There was great relaxation of the attachments of the knee both on the inside and outside, as shown by the ease with which the leg could be bent externally and internally. When the ankle was pulled externally and the knee pushed in, the space between the inner condyle of the femur and the internal tuberosity of the tibia was much greater than that of the other leg, evidently due to absorption of the articular surface of the inner condyle; and, confirmatory of this, the leg when extended was straight anteroposteriorly, whereas in the natural condition it ought to have deviated slightly in at the knee and out at the foot. When the foot was pulled inward and the knee pushed outward it was astonishing to what extent the outward bending went, and this produced discomfort at the inner aspect of the joint and was attended by a noise and feeling as if the spine of the tibia were slipping in and out of place. Altogether it was a curious and interesting knee.

The effusion in the synovial sac under the quadriceps extensor rapidly disappeared under massage every other day and a bandage worn in the intervals. After the first massage it was three-eighths of an inch less in circumference around the seat of the swelling, and in two weeks it was all gone. Moderate efforts at rectifying the position of the leg were of no avail. After the effusion had disappeared the problem seemed to be that of strengthening the limb, and for this purpose resistive movements of pushing and pulling while the patient was lying down were alternated with the massage. She exhibited unusual vigor in pushing and pulling the leg against the resistance, which increased our wonder at her inability to use it better when in the perpendicular position. After three weeks of this there was no improvement in walking, notwithstanding increase of strength in flexing and extending the leg and thigh against resistance while lying. Thinking that perhaps she might be able

to walk better if we could get the quadriceps-extensor muscles strengthened, we found at the first trial that she could hold the leg extended for one minute, an unusually long time to begin with. After five minutes of massage to the quadriceps extensor she held the leg out for one and a half minutes. Two days later, two minutes before massage and three minutes after. But still no improvement in walking. A well-padded hamsplint was faithfully tried and afforded neither support, ease, nor comfort.

A year or two later I called to see this patient, and learned from a relative that she had died of pneumonia, and that several months after I last saw her the knee had rectified itself so that she could go up and down stairs naturally.

Dr. S. when a boy was brought up on a farm, and when milking one of his legs would frequently get painfully flexed under the other with the foot turned in. It hurt severely to extend it, but when once extended it seemed well again. On one occasion when he was swimming the accident occurred and was followed by an attack of acute synovitis, after which he got all over it and had no return. In all probability the effusion allowed the displaced cartilage to get back into its natural position, and the accompanying inflammation caused it to adhere there,—an event that would not have been likely to have taken place if the leg had been put in a splint or plaster-of-Paris dressing.

The following case is narrated by Dr. W. H. Bennett: A soldier had a displacement of the internal semilunar cartilage which was replaced soon after the injury by his doctor. The ordinary exercises of the gymnasium were at once prescribed. At the end of a week the displacement recurred, pain was intense, and complete extension impossible. Reduction was attempted, but without success. The exercises were continued and as much walking as possible. Six weeks later the leg was still flexed and could not be extended by manipulation, the knee was distended, and pain on walking acute. Rest for a fortnight and massage without exercise removed the fluid, and reduction occurred spontaneously while turning in bed; but recurrent attacks followed until he was operated upon and a piece of the semilunar cartilage removed.

Text-books on surgery are wofully deficient in information concerning displacement of semilunar cartilages. The best monographs on the subject are by Dr. Scott Lang and Herbert W. Alling-

ham, and from these we learn that the semilunar cartilages may slip forward, backward, inward, or outward. The internal semilunar cartilage is the one most often at fault. As to the symptoms in general, the knee is usually semiflexed and cannot be extended; but flexion is usually free in recent cases. The foot is turned outward when the internal semilunar cartilage is displaced; inward when it is the external semilunar cartilage. In most cases little or nothing abnormal can be seen or felt about the joint, except the semiflexion and a little tenderness at the head of the tibia. Rarely can the cartilage be felt projecting, and even when it does synovitis may supervene in a few hours and mask the symptoms.

As to the causes: Though any violent accident may produce internal derangement of the knee-joint, most cases would probably coincide with Dr. Knott's instructive description of his own case: "It has always been the result of a very slight, and in every instance an indirect violence. This violence has always been applied so as to produce a twist at the knee, either of the leg outward or of the femur inward. The most common cause has been striking the inside of the great toe against something when the knee has been slightly flexed, the parts about the joint as relaxed as possible, and the muscles thrown off their guard. I never suffered any derangement when the limb was in a decided state of active motion." *

The whole subject has been still further elucidated by Dr. Scott Lang in the Edinburgh *Medical Journal* for 1886-87, who points out that the internal semilunar cartilage is displaced in rotation of the leg outward combined with flexion, the external semilunar cartilage in rotation of the leg inward combined with flexion, and that the injury is caused by some sudden and almost involuntary movement when the muscles governing the joint are off their guard or fail to act in concert with one another. A lax condition of the ligaments and muscles of the knee-joint from general debility or previous synovitis would predispose to these accidents.

Laying aside cases that require surgical interference by cutting into the joint, the indications for treatment must be very clear. Restore the cartilage to its natural position if possible. Retain it there. Strengthen the joint and muscles so that they will be less likely to be caught off guard. Various suggestions are made as to

* Dublin Quarterly Review, 1882, page 489.

the methods to be pursued to replace the semilunar cartilage. When one fails another is tried. The method that seems to be most relied upon is: flex the leg as much as possible upon the thigh, then rotate the tibia inward if the inner cartilage is displaced, outward if the external, and extend the leg quickly upon the thigh while pressing with the thumb where the cartilage is supposed to be out of place. The opposite procedure—extension, then flexion with pressure—sometimes succeeds. As it may be very difficult to ascertain whether a cartilage has slipped out of place or not, Dr. Samuel J. Mixter has made the very shrewd suggestion that every case of sprain or twist of the knee should be put through movements of replacing a dislocated meniscus. But if a semilunar cartilage is not displaced, it is very evident that such a procedure would hurt the patient unnecessarily and be very likely to aggravate a sprain of this joint, and if a semilunar cartilage were not displaced, such movements might put it out in a sprained knee.

Concerning this point Dr. William H. Bennett says that repeated futile attempts at replacing the structure which is supposed to be displaced have been the cause of some of the worst cases of traumatic arthritis of the knee-joint with which he has had to deal, and in two led to the development of tuberculous disease. Temporary fixation and massage he considers of the utmost importance for the removal of the fluid from the joint and to allow the loose portion of the cartilage to fall back and adhere in its normal situation, which with the help of the surrounding inflammation often follows to some extent. Massage of the muscles and of the joint without motion cannot be commenced too soon, for it prevents the wasting of the muscles and the flaccidity of the capsule. Passive motion without rotation should soon follow, as it prevents adhesions; but passive or active motion involving rotation should not be encouraged in the early stages.

It does not seem to me that a hamsplint or a plaster cast is so direct and effectual in retaining a semilunar cartilage and supporting and comforting the knee as a pad with a snug bandage over the offending region. Moreover, there would seem, in some cases, at least, to be a tendency of these cartilages to slip back into place even when attempts to readjust them had failed; but if the joint is immovably fixed by a hamsplint or plaster cast, its power to adapt itself to a return of the cartilage by gentle instinctive change

of motion is prevented, which is not the case with a pad and bandage. For the relief of the heat, pain, and swelling that result from a sprain, wrench, or twist, massage properly applied is most satisfactory. For the preservation of the circulation and nutrition of the muscles and the prevention of atrophy, massage applied early has proved to be quite effectual.

As displacements of the semilunar cartilages are most likely to occur when the muscles are off guard, so to speak, our endeavors should be to strengthen these muscles so that they will not be "caught napping." I imagine that the behavior of muscles in this manner is due in great measure to a loss of "muscular sense," the restoration of which is promoted in an astonishingly agreeable manner by means of massage, which at the same time helps to bring back the automatic action of will and spinal cord in presiding over these lazy sentinels. And this will be still further aided by alternating massage with carefully graduated movements of pushing and pulling, and of voluntary efforts of holding the leg extended. A few minutes' application of the faradic current to the quadriceps extensor muscles immediately after the massage sometimes seems to have a more invigorating effect than either alone, and, moreover, the contractions caused by the faradic current are but another and useful form of motion—semiactive, semipassive.

Walking with the foot turned inward is considered to be a good precautionary measure when the internal semilunar cartilage is liable to slip out of place, with the foot turned out when the external cartilage is likely to slip, according to Scott Lang; but as either of these positions allows all the more latitude for rotation in the opposite direction when the knee is semiflexed, it can only be safe so long as the patient receives no violence to throw the leg in the opposite direction; whereas, if the patient walks with the foot turned out and knee extended, where it is a question of preventing dislocation of the internal semilunar cartilage, then, as it is already in the position where the cartilage is liable to be displaced, but with the muscles on guard, unexpected violence is resisted, and the range of motion that would be dangerous is reduced to a minimum, as was the case with the second patient reported in this chapter.

In cases that have required operation for the removal of the semilunar cartilages or for stitching them in place the joint is gen-

erally stiff for some time afterwards. As soon as two or three weeks after the operation Dr. Allingham recommends daily massage and passive motion, and later that the patient should try to sit on his heels. A much safer plan than the latter is for the patient to hold on to something, such as the mantel-shelf or foot of a bed, so as to graduate and control the weight upon the knee.

Full of significance are the following words of Dr. A. Logan Turner in his article on "Internal Derangement of the Knee-Joint," in the *Edinburgh Hospital Reports,* 1894, Vol. II.: "In order to gain some idea as to how soon after operation a man may return to his work, one must take into consideration the nature of the occupation, the length of time during which splints have been worn, and the amount of care which the patient gives to massage and movement."

From the foregoing the following conclusions would seem to be justifiable:

1. That neither in their natural nor unnatural position can semilunar cartilages often be distinguished from the surrounding tissues. They seem to form an inseparable part of the head of the tibia.

2. That the position of the leg affords the best means of inferring whether one or the other semilunar cartilage may have been dislocated when it cannot be felt, the leg being usually flexed and the foot turned out when the internal meniscus is dislocated, the leg flexed and the foot turned in when it is the external.

3. To attempt to replace a dislocated semilunar cartilage it is wise to flex the leg, then extend suddenly, rotating the leg inward if it be the internal cartilage, outward if it be the external, while exerting pressure over the offending region.

4. That there is a natural tendency in some cases of dislocated semilunar cartilages to slip back into place when the leg is not artificially restrained.

5. That if the knee be immovably fixed by plaster or splints before the cartilage has gotten back into its natural situation, the joint is locked and restrained from gentle instinctive movements that might favor its return.

6. That cases of displaced cartilage are attended by voluntary and involuntary restraint of motion on account of pain and mechanical impediment, and in some cases by synovitis and the formation

of adhesions. Forcible passive motion might then have the double purpose of breaking the adhesions and rectifying the displacement, as possibly occurred in the second patient of this chapter.

7. That even after a meniscus has been restored to its natural situation it is not so securely and comfortably held by plaster and splints as by a pad of a few folds of bandage and a figure-of-8 bandage applied over this, which affords support and comfort and a safe limit of motion.

8. That it is possible by carefully applied massage, resistive movements, home exercises, and electricity so to strengthen the muscles on the front of the thigh, the fascia, ligaments, and attachments of the knee-joint, that they will safely hold a previously dislocated semilunar cartilage without artificial support.

9. These remarks do not apply to cases requiring surgical operation, though the above-mentioned combination of treatment might be safely tried in some cases before cutting into a knee-joint, but more especially after operation for restoring motion and strength to the knee. The symptoms, diagnosis, and treatment of displacements of other interarticular fibro-cartilages have not yet been properly studied by anyone that I know of.

XXIV.

Massage and Faradism as Analgesics in the Loosening of Joint-Adhesions.

"Motion is the manifestation of life in all things."

In 1884 I began using a strong faradic current for the immediate relief of pain caused by forcible stretching and loosening of adhesions about joints, and I have continued to do so ever since with, in almost every instance, more speedy relief than could be obtained in any other way. Partial relief is in most cases immediate, and complete relief soon follows, so that the stretching and rupture of adhesions can be repeated several times at one sitting, a procedure to which the patients willingly submit, knowing that the pain can be so quickly stopped. Massage will accomplish the same object, but in general not so rapidly.

My plan in these cases is first to ascertain how much active motion the joint is capable of, then to find the limits of passive motion, after which I proceed with massage, alternating with gradually increasing passive motion until the limits of the latter without breaking adhesions are reached. If these can be started without putting the patients under ether, I do but a little at a time; then, having a faradic apparatus in action at hand, I apply a comfortably strong current by means of two tolerably large electrodes, covered with sponge or absorbent cotton, to each side of the painful joint or to its anterior and posterior aspect, or wherever the current is most accessible to the painful place, and usually in from thirty to sixty seconds there is complete relief. Then I proceed with massage, passive and active motion, for five or ten minutes, after which I increase the passive motion to the extent of tearing the adhesions a little more, and I follow this by the same means of relief. In this way patients have immediate use of all the motion thus gained, and for adhesions that are neither too deep nor too strong it is preferable to breaking them down under ether. Under anæsthesia so much is likely to be done at one time that the joint is lame and sore and useless for weeks or months after; or, what is more, the adhesions may re-form stronger than before, unless

massage and passive motion be early applied to prevent this. Furthermore, this plan of massage, and passive motion gradually increasing to the extent of loosening adhesions, will quickly show whether these are so strong or the involuntary tension of the muscles so great that they cannot be entirely overcome without putting the patient under anæsthesia. In doing this time is not lost, for massage with passive and active or resistive movements are the best means preparatory to breaking down adhesions under ether; they facilitate the motion of the joint and the relaxation of the muscles as far as the adhesions will allow.

I had supposed that this method of using the faradic current for the relief of pain caused by the breaking of adhesions without ether was in common use, but recent inquiry and research have failed to reveal to me that the analgesic effect of the faradic current has been used by anyone else for this purpose.

As no trustworthy instrument for measuring the faradic current has yet been discovered, I am unable to give the strength of current which has proved most beneficial in different cases. The susceptibility of the patient must be taken into consideration, and also the fact that a strong current is scarcely perceptible upon well joints. After massage the tissues are much more susceptible to electricity than before. In general the current should be strong enough to produce contraction of the patient's healthy muscles, and this might serve as a guide for its application on or near joints after the breaking down of adhesions. When adhesions are slight and yield easily to moderate force massage afterwards will prove sufficiently palliative, but where they are moderately strong and stubborn the faradic current would seem to afford the quickest means of relief after stretching or tearing them, while for firm, deep adhesions and obstinate muscular contraction there is nothing but the forcible breaking of them under ether. In these last cases I have never tried the faradic current, but gentle massage has afforded immense relief as soon as ten hours afterwards.

I have at present under treatment a patient with periarthritis of the shoulder-joint to whom the faradic current is very disagreeable, but after an upward pull so vigorous as to stretch or tear the adhesions pain has been speedily relieved by the immediate application of the faradic current, and as soon as the pain has gone the disagreeable sensation of the current has been felt. He has had

gradually increasing periarthritis of the shoulder for over a year, and under the plan of treatment here outlined he is now, at the end of three weeks, almost well, and the faradic current is no longer necessary for the relief of the slight pain caused by the forcible pulling of the arm upward.

An excellent procedure in these cases, and one which I had never heard of until I employed it myself, is to tire out the stronger opposing muscles by means of resistive motion, as, for instance, in the case of the shoulder the muscles that pull the humerus down, by making resistance at the elbow while the patient pulls this down. After a dozen or twenty-four pulls in this manner the deltoid, which has long been weak from inactivity, can often raise the humerus much higher, and thus show much more clearly to what extent adhesions, if they exist, limit motion. This is taking advantage of a physiological principle, that by increasing the contraction of a muscle we at the same time increase its relaxation. A contracted muscle with a weight attached to it extends more than it does when relaxed with the same weight attached to it. By these methods I can now work out cases to a satisfactory termination that formerly would have defeated me.

In illustration of the immediate pain-relieving quality of the faradic current after stretching, loosening, or tearing adhesions I will narrate in detail but one case.

Miss B. W., twenty-one years of age, had always been well and active until a year previous to my being called to her. She had then had an attack of acute rheumatism, which first appeared in her wrists and lasted for seven days. After this it migrated to her left knee with greatly increased violence. At the expiration of eleven weeks, the knee being in extreme flexion and the acute symptoms having subsided, extension under ether was attempted, with the result of bringing the leg to an angle of one hundred and thirty-five degrees with the axis of the thigh posteriorly, or of forty-five degrees with the axis of the thigh anteriorly, where it remained stiff and immovable. The immobilizing material, splint or plaster, put on after extension had pressed too hard against the posterior aspect of the head of the fibula, notwithstanding the patient's protestations, and when at the end of three weeks this was removed it was found saturated with a discharge that came from a sore immediately behind the head of the fibula just over the peroneal nerve.

This discharge continued for many weeks more. Doubtful whether she had received proper treatment or not, and almost despairing of improvement, at the end of a year she consulted Dr. George W. Gay, who at once referred the case to me. I found the knee-joint almost completely ankylosed. Motion was scarcely perceptible and gave great pain. The acute symptoms had subsided, and there was but little swelling in and around the joint, and what there was seemed to be due to thickening of the capsule. The hamstring muscles were moderately tense, not contractured, but retracted. The case evidently was one of fibrous ankylosis with some destructive arthritis of the joint-surfaces. Behind the head of the fibula there was a red cicatrix closely adherent to the bone and implicating the peroneal nerve, as a result of which the foot drooped downward and inward, and there was no power of voluntary flexion (loss of contraction of the extensor muscles), but when it was put in the position of dorsal flexion the muscles on the back of the leg could extend it vigorously against resistance. The lower third of the outer aspect of the leg, the ankle, and the back of the foot were devoid of sensation, and could be pinched and pricked without pain. There was paralysis of both sensation and motion and the foot and ankle were œdematous. The musculocutaneous branch of the peroneal nerve was most affected.

It seemed to me exceedingly doubtful whether I could benefit this case. After massage at the second visit the first attempt to pull the knee straight hurt the patient for twenty-four hours and apparently did no good. I did not have my faradic apparatus at hand. The pain of forcible manual extension, however, gradually decreased, so that on and after the eighth day from my first visit I was giving the leg two vigorous pulls at each sitting, at which adhesions could be heard and felt breaking, and relief was quickly obtained by the faradic current. At each visit I *masséed* the whole limb, gave passive motion to dorsal flexion of the foot, resistive motion to extension, and two or three forcible pulls of the leg to the extent of tearing adhesions, the pain of which was relieved with wonderful uniformity in thirty seconds, and completely removed in sixty seconds, by the faradic current applied to each side of the joint anteriorly. Occasionally for the sake of comparison I would use massage for the relief of pain following the pull, and it almost invariably took about twice as long as the faradic current,

but even this was brief. The electricity was also used over the paralyzed regions. Between my daily visits the extension was maintained, at first by bandaging the limb to a curved hamsplint, later to a straight hamsplint, and after a time extension and support were kept up at the same time by a simple apparatus with one cap that buckled over the knee, and a counter-support or band behind at each end attached to light steel side-pieces. The counter-supports behind turned on pivots, so that they always adjusted themselves to the back of the thigh, and the straps of the knee-cap were freely movable up and down. When this apparatus was on we attached to the outside of it at the knee a piece of strong elastic webbing, the other end of which was fastened to a band around the ball of the foot. By pulling this tense and buckling it at the knee the foot was brought into dorsal flexion, the voluntary power to do which was lost. Thus the patient had under her own control the means of resisting extension of the foot, which, as soon as the extension was over, pulled the foot back to flexion, giving passive motion to the powerless muscles in the front of the leg. It proved a perfect device for active extension alternating with passive flexion of the foot, and the patient did not fail to utilize it many times a day.

Under this plan of treatment she steadily improved, so that at the end of three weeks an outline of the leg compared with one taken at the beginning showed a gain of extension of two and one-quarter inches at the ankle, nearly one-half the distance required to bring the leg straight, and at the end of eight weeks the gain was four and three-quarters inches, straight enough for walking, but the joint was still tender on pressure, and the patient had forgotten how to walk. Adhesions were no longer heard or felt breaking by vigorous extension, but the pain of this was still relieved by the faradic current. Anything like free passive motion was entirely out of the question, and it very soon became evident that our best endeavor must be to get the patient well with a tolerably stiff straight knee in place of a stiff bent one. Even the slightest attempt at flexing the knee caused the most excruciating pain and gave warning that it must not be persisted in. One evening when sitting in a rocking-chair without her support a playful relative pulled the chair backward, which bent the knee and hurt it much. She had the battery brought to her, started the current, applied

it herself, and was quickly relieved. An acute synovitis followed for several days to tell the tale.

At the end of three months the lost motion and sensation in leg and foot showed signs of returning, and it was at this time also that she took her first walk alone, steadying herself by the wall. A week later there was great improvement in the impaired sensation and motion, which had been so slow in beginning to return. At the expiration of four months she walked three-quarters of a mile away from home and the same distance back again, going up and down two flights of stairs at the same trip and carrying her crutches with her for security, but not for support. A week later she could flex the foot to a right angle, and two weeks after this she could flex it against resistance, and sensation was correspondingly good. Treatment was then discontinued and the patient went about freely with a stiff knee, wearing for security rather than for support one of the ordinary knee-supporting apparatuses attached to the sole of the boot and extending above the knee with joints at ankle and knee. Vigorous extension then no longer hurt the knee, which seemed an indication that all had been accomplished in this direction that could be, but any attempt at flexion gave ominous warning that it must not be persisted in.

Thus in six months this patient had a useful limb which there is every reason to suppose she would not have had but for the treatment employed. Two years and a half after this I saw her again. She could walk long distances without fatigue. The cicatrix behind the head of the fibula was freely movable. There was very slight motion in the knee, and forced flexion made it go no farther than voluntary. From this time onward she discontinued all support on the limb. A year later I saw her again, and she had excellent use of the limb for all requirements except for going up and down stairs in the usual way. Forcible flexion and extension with all my might did not hurt the knee in the least and moved the joint but very little. The patella had but little motion, and that laterally. She could dance eighteen dances in an evening, besides being on her feet most of the day.

More recent experience has shown me that many of those cases of stiff joints get complete relief from the faradic current in from ten to twenty seconds after breaking adhesions.

I have also tried the plan of attempting to stretch adhesions

and shortened and indurated tissues while the faradic current is passing, and find that it lessens the pain considerably. In the case of the knee-joint, patients can apply the poles themselves while the leg is being flexed or extended.

While a strong faradic current has been passing through the affected parts teeth have been extracted and felons and buboes opened with little or no discomfort; and after the use of caustics and irritants to the uterus and other regions the annoying pain caused thereby has been much relieved by the application of the faradic current. (Beard and Rockwell.)

XXV.

The Advantage of Massage in Rheumatic Gout.

"I'll knead him; I'll make him supple."—SHAKESPEARE.

RHEUMATIC gout, rheumatoid arthritis, or *arthritis deformans*, is too familiar to us all to need any lengthened description. We readily distinguish it in most cases by its slow and progressive character, by its chronic or subacute course, with frequent exacerbations and remissions; by its spreading symmetrically from the small joints to the larger, usually in the upper extremities first; by the thickening, permanent enlargement, and often deformity, it occasions; by its never affecting the heart and not being hereditary, and by its attacking females oftener than males. The term rheumatism is too often used to cover a multitude of diseases, as charity is to cover a multitude of sins; and when rheumatism assumes a chronic form after an acute attack it may be impossible to see any difference between it and rheumatic gout. Recent views regard arthritis deformans and kindred disorders as possibly of nervous origin. This might seem to be the case when the malady begins with a quiet pulse and clean tongue, and when the patient complains of languor, loss of appetite, pain, stiffness of the joints, and perversion of nutrition. But as to causation, the ground may be easily covered by saying that whatever deteriorates the system, whether by mind or body, in those predisposed to this or any other disease may, and probably will, precipitate its onset.

It is to be regretted that our success in the treatment of this obstinate affection is not equal to our knowledge of its pathology. An ounce of relief or an extra inch of motion is worth infinitely more to a patient than a foolscap of information to the effect that the disease is a panarthritis involving cartilage, bone, and synovial membrane, ligaments, tendons, and bursæ, with thickening of the articular lamellæ and thinning and alteration of the cartilages. With strange inconsistence Professor Senator, of Berlin, in his "Treatise on Diseases of the Locomotive Organs," describes this malady as usually selecting joints which are most continuously and severely overtasked, as in sewing, knitting, watchmaking, and the

like; while on another page he tells us that the thumb is generally spared and remains freely movable, as if it were not tasked as much as the fore and middle fingers. For such a description he may be credited with drawing on his imagination rather than on observation. I am sure we all know that the freedom of motion is longest preserved in those fingers which are used the most: first, in the index; second, in the middle finger, while the thumb shows greater signs of being affected, and the ring and little fingers are generally worst of all. Moreover, Senator's description is again at variance with the only remedial course, of which he speaks in unequivocal terms by saying: "It is important in all the forms of this disease to maintain the functional activity of the affected joints, as far as possible, by means of active and passive movements. Absolute rest promotes stiffness of the joints, fixes the limbs, and atrophies the muscles." If his first statement were correct, then the treatment he so strongly recommends would be veritable homœopathy,—disease produced by motion, relieved by motion. But, unfortunately, this is not so, at least with regard to dosage, for in using massage and passive motion in these cases long and frequent visits and arduous work are necessary, and in my experience amply repay both patient and physician for time and trouble expended. Led on by gradual improvement from the use of massage in five out of six cases of well-marked rheumatic gout, I kept up this treatment until unlooked-for results were obtained, so that four of these cases regained tolerable use of the affected limbs, and in one recovery seemed to take place. Berghman and Helleday report three cases, Cronfeld one case, and Balfour, of Edinburgh, two cases of rheumatic gout treated by massage and movements with results similar to those I have obtained, and only one of these had a disappointing relapse. The mode of procedure in my cases was deep manipulation without friction or inunction, passive motion as far as pain would allow and sometimes farther, and resistive motion as soon as it could be done, the details of which I have described more fully elsewhere. If pain disappears soon after it is caused by any of these operations, it may be disregarded; if it lasts for several hours and increases after subsequent efforts, they must be suspended. Kneading with one hand so as to break up indurations or disperse effusions, while the other hand pushes along the circulation in the veins and lymphatics above the joint, is often a good procedure and

quickly leads to the absorption of products not too firmly organized. Blisters and powerful derivatives in the neighborhood of joints affected with rheumatoid arthritis are considered more likely to promote than to retard the affection, according to the studies of Senator. Massage of the adjacent skin and muscles acts as a physiological derivative and raises nutrition to a high degree by a rapid interchange of materials, owing to the area and speed of the circulation being increased and obstructed lymphatics and capillaries made permeable. In this manner the soft structures may be made to adapt themselves to nodosities and deformities that cannot be removed.

When the disease is very active, or the muscles fattily degenerated, the tendons frayed out and thinned, and loose cartilages in the articular folds of the fibrous membrane, or when bony ankylosis has taken place, we would not expect anything from massage. All of my cases had been well-nigh rubbed to death in the ordinary way, besides having exhausted the resources of the materia medica, baths and mineral springs of all kinds, electricity, etc., before coming to me for massage.

Case I.—Miss A. was sent to me by Professor Da Costa, of Philadelphia, in 1873. She was then seventy-eight years of age, and had been bedridden for eight months with rheumatic gout. The disease had affected every joint of her limbs, and apparently had run its course and done its worst. There was eburnation of the articular surfaces and rattling of the bones, with distortions of almost every joint. There was neither ankylosis nor contracture, but only slight, indolent thickening around the joints with great muscular weakness. The patient was nervous and depressed. Pulse 92 and dicrotic. After one application of massage she could put her arms under the bedclothes and pull them up around her neck. Four days afterwards, having had daily massage, she could reach back so far as to get an object behind the pillow on which her head rested, sleep was better, and she was greatly soothed by the manipulation. In seven days her pulse was down to 79 and steadier, and she walked across the room half supported. The following day she fed herself for the first time since her illness. In three weeks she could walk twice the length of her room with slight support. It seemed cruel to ask this patient to walk, so badly were her ankles deformed. But there was no pain: the sensitive struct-

ures of the joints were probably destroyed. This patient had massage twenty-three times in one month, and the use of her limbs and general condition were greatly improved. I fancy there may have been times during her illness when massage would not have been of much use to her. She was the most delicate of a family of six, having suffered from pleurisy, pneumonia, hemorrhages from the lungs, etc., and she outlived them all.

Case II.—Mr. S., about fifty years of age, was sent to me by Dr. Thomas G. Morton, who had clearly explained to him the nature of his affection and told him that benefit might result from a long course of massage. For a year the patient had suffered from periarticular thickening of the finger- and wrist-joints of a semi-solid nature, less of the elbows, ankles, and knees, in all of which places there were frequent but not severe attacks of pain of a non-inflammatory character. His general health had greatly deteriorated, sleep was poor, appetite small, and he had lost flesh, but still he could go out every day and attend to some business. Daily massage was used for a while, afterwards every other day. Improvement was slow and almost imperceptible. At the end of ten weeks the periarticular indurations had decreased, the joints were more comfortable and more flexible, sleep and appetite had improved, and the patient had gained flesh. At the end of four months massage was discontinued, the patient being to all intents and purposes well, having regained his natural sleep and appetite and increased in weight to a marked degree, the circumference of his wrists with the improved nutrition being the same as when the induration was present. There was still slight enlargement of some of the phalangeal joints, but the patient could shut his hands firmly, whereas at first they could only be semiflexed. He said if he had thought that he could be cured in this way, he would not have sold his house and business with the expectation of going to Europe to seek for relief.

Case III.—Mrs. A. G., thirty years of age, enjoyed good health until she was nineteen years old, when rheumatic gout appeared, first by swelling and pain in the last joint of the left thumb, and soon the other joints of both hands and fingers were similarly affected. Four months later the ankles became swollen. Then there was a respite for a year, and at the end of this time there was another exacerbation for five weeks. Six months later it was

apparent that the hands and feet were "growing out of shape." About this time she became pregnant, and the disease was in abeyance during this state, but after the child was born the joints were generally affected as before. Again there was a year of improvement, followed by grief and taking cold, which caused a relapse, and in 1877 she walked with great difficulty. Then iodide of potash, arsenic, a sojourn at Caledonia Springs, and electricity were tried, but the patient grew worse. In the summer of 188—1 Dr. Goodrich, of Bakersfield, Vermont, rubbed the knee-joints very hard and hurt the patient a good deal, but she improved so that she could walk with a cane and go up and down stairs, though the legs were greatly bent. She relapsed again in a few weeks.

This patient came to me in February, 1882, with knees flexed to almost a right angle. There was slight effusion in them and dry creaking on motion. There was thickening around the ankle-joints, though the motion was free and strong. Hip-joints not affected. The ring and little fingers of both hands were hopelessly deformed, the first row of phalanges being extended far back, the second and third sharply flexed and ankylosed. The thumbs, fore, and middle fingers were somewhat out of shape, but remarkably good use of them was retained. The left wrist was strongly flexed, the elbows and shoulders comparatively free, though they had been severely affected. The patient was bright and cheerful and looked healthy, notwithstanding that she was suffering from general bronchitis and weighed only eighty-two pounds. Her appetite was fair and bowels constipated. A tonic pill to increase the appetite and regulate the bowels was given and general massage used daily. Her joints were not very sensitive, and from the first the massage was agreeable; the aches and pains disappeared in too remarkable a manner for me to ask anybody to believe. In three weeks she was eating very heartily, was taking five goblets of milk daily, and was free from discomfort; and after vigorous extension of the knees, which hurt at the time, they felt better all day, and we had gained one and one-quarter inches of extension at the ankle. In two months the menses, which had been absent for eighteen months, returned, and they have continued to return ever since with greater regularity than they ever did before. In three months nutrition had improved to a marked degree. At the end of this time, the patient having been in preparation by a variety of impromptu, gradual

extension apparatuses, I put on each leg long, lever splints, which made extension from the heel, and pried down the knees by means of wide bandages above them on the anterior aspects of the thighs, while the short arms of the lever rested on the back of the thighs.* These were kept on night and day for twelve days, and during the last seven days of their use the limbs made daily extension. After they had been on for twenty-four hours the patient really liked them, and later, when temporarily removed, she felt faint for want of their support. They were then removed for eleven days and light hamsplints applied, and with these the patient stood up. After six days more of the long splints the legs were about as straight as people's usually are in use. By this time the joints had become sore and the patient was not sleeping well. Two weeks later the patient walked twice across the room, pushing a chair before her to balance herself; ten days afterwards she did this twenty-two times, and in ten days more she walked without anything for support except light wire hamsplints. Four weeks later she was going up and down stairs alone, and two weeks after this she frequently took a walk of half a mile with the aid of an arm and her hamsplints, then six months from the time treatment was begun, massage having been kept up all this time. At the end of seven months and a half the patient returned to her home wearing the usual support for weak knees, but, unfortunately, when these were unfastened there was not much bend to the knees. This, however, has improved by the patient's efforts. The flexed wrist and movable finger-joints made good progress under massage. Eight months after her return home the patient could sit down and get up from an ordinary chair, without arms, and run a sewing-machine. Sixteen months later I removed entirely the knee-supports and gave her a short course of massage with increased improvement. Eighteen months later the patient wrote to me that she had improved beyond all expectation, had been out in all kinds of weather the previous winter, and had enjoyed the novelty of walking upon the snow after having been confined to the house for nine consecutive winters. When the thermometer had stood many degrees below zero she had taken long walks, and while other

* I first saw this used by Dr. E. H. Bradford to straighten bent legs resulting from infantile paralysis.

articular extremities of the bones, of course, could not be removed. He *masséed* the patient daily and gave her passive and active motion, and after fourteen days he had the pleasure of seeing the swollen joints decreased in size and the motion improved and less painful. At the end of a month the patient could walk about her room with a cane, and the improvement was so great that recovery seemed possible. For the next four months the patient was *masséed* by the assistant, Dr. Schmidt. The result was that the pains and swellings of the joints and capsules disappeared and they became movable to almost a maximal extent, except in one elbow which had undergone bony ankylosis. The muscular strength of the patient had increased so that it often tired out the operator to give her the active or resistive movements. She could walk in her garden for fifteen minutes without fatigue. Nutrition improved more and more, the anæmia disappeared, the pulse became regular, and menstruation returned, unaccompanied by fits of prostration as formerly. *Tapotement* or percussion with the ulnar border of the hand, with the palm, and with the fist was freely used in this case.

In several cases of chronic articular rheumatism Professor Gussenbauer reports favorable results from massage.

Case V.—While some patients become thin under rheumatoid arthritis, others grow fat. Such was the case with Mrs. J. L., fifty-eight years of age, who had suffered with this disease for fifteen years. In seven months under massage she regained free and natural use of her limbs, which she retained until a short time before her death. For the first two years her joints gave her but little trouble, but at the end of this time she was confined to bed for five months with arms so stiff and painful that when they were out of the bedclothes she could not put them in again alone. Later the trouble left the arms and appeared in other places, but never in the toes. Her history is one of pains and stiffness of joints and muscles, with occasional remissions, the disease all the time slowly progressing. Her condition had been made much more comfortable by alkalies and laxatives prescribed by her physician, Dr. J. P. Oliver, who referred her to me for massage. Previous to her malady she had been very thin and active, but for the last ten years of her illness she had grown very fat and heavy. For the last year before I saw her, her mode of locomotion indoors had been by means of a wheel-chair, and it was with difficulty she could be got in and

out of a carriage. On each side of the patellæ it was evident through the layers of adipose that the capsules of the knee-joints were thickened, and it was to these places the pain of extension was referred, and this was limited to about three-fifths its normal range. Flexion was natural and dry crepitus could be heard and felt on motion. Massage and movements every other day, with the use of curved hamsplints, and, later, straight ones, produced good results. In five weeks she was walking about the house with crutch and cane, and the legs could be straightened so that the popliteal spaces would touch an applied straight hamsplint, and free motion was gained to this extent. The splints proved a support and comfort in walking, and were worn for several weeks longer to overcome the tendency of the posterior femoral muscles to shorten. At the end of three months the patient could walk the length of a room and back again without support of any kind after getting started by assistance for a few steps. She had then lost the pain in the joints that troubled her by night, and pulling the legs no longer hurt the knees as formerly. When the knees ached walking relieved them. The indurations and thickening were disappearing, and a hard, painful spot behind the left hip had entirely gone, and the patient could turn easily in bed. In six months the patient walked easily and gracefully without a crutch or cane or splint. A month later she got up from her chair alone and walked as well as anyone of her weight could be expected to do, and the improvement continued for six months longer, until an affection of a different kind supervened and suddenly carried her off. I need not say how sorry I was to lose this patient, who did me as much credit as any I ever had. The beneficial change in the knees was an indication of what had taken place in the other joints, in the fingers, wrists, and elbows, disappearance of indurations, and increase of motion.

Case VI.—Miss E. P., forty-five years of age, at the change of life, well nourished, and a picture of health, has suffered from rheumatic gout and its variations for five years. During its early appearance, while crossing the Atlantic and returning, all the symptoms disappeared, only to return as soon as she landed. Two years after the disease began she suffered from severe gastric disturbances for several months, and during the most of this time the joints were remarkably well. With the disappearance of the

stomach trouble the mischief in the joints returned. The patient had derived, and still continues to derive, marked benefit from forty to eighty grains of salicylic acid given in divided doses during the day, with bicarbonate of soda and carbonate of ammonia. This was prescribed by her physician, Dr. Lucy E. Sewall, who referred her to me for massage. As the patient was improving, I could see no need of adding this treatment, for cauterization of the knees was having a good effect and making them feel better all day afterwards. It was agreed, however, to try massage on the worst limb, the right leg. There was a mass of feebly organized, indolent tissue in front of the condyles, which was easily dispersed and its absorption hastened by massage; even the first sitting producing a marked effect, so that the adherent skin became free and the hyperplastic tissue softer. At the end of a week, with daily massage, this semi-indurated tissue had almost entirely disappeared, and the feeling as if the joint were held by an iron band in front of it had correspondingly lessened; the patient could stand more easily and push the limb against resistance more vigorously; the œdema of the leg and swelling of the ankle, which were partly controlled by a bandage, had also decreased. During the first three weeks daily gain was perceptible, and at the end of this time her physician asked me to apply the same treatment to the other leg, which had not been getting along so rapidly under cauterization as the worst one had been under massage. After this they improved *pari passu*. A splint was worn for twenty hours every other day on the right leg, and this was well tolerated and soon overcame a tendency to bending of the knee. The hands and arms made progress, and in two weeks she could use them more freely and write more easily. At the end of thirty-nine days, having had daily massage, the patient took a ride, getting in and out of a carriage with an ease that surprised herself. Three weeks before this she could scarcely take a step, and for a year she had not been able to walk in any way worth mentioning. Massage was then used every other evening, and she always slept well after it, but not when it was omitted. Manipulation always made her lame and sore for several hours afterwards, only felt, however, on motion. She continued to gain under massage until she went to the country, two months from the time it was begun. She improved for three months while in the country, but on her return to the city she

rather lost ground, which massage scarcely made up for. After two months more of this treatment it was suspended for two weeks, and during this interval she suffered from general stiffness, wakefulness, and fulness in the head, all of which disappeared promptly on resuming massage. And now, in spring-time, with the most unfavorable weather and arduous professional duties, the patient is again improving. She has good use of her arms, the thickening of the knee-joint capsules is decreasing, and she walks pretty well with very little assistance.

Case VII.—Mrs. C. J., fifty-two years of age, has had rheumatoid arthritis for eight years, which has pursued a relentless course in spite of twenty-three physicians and all sorts of treatment. The joints of her hips and back are the only places free from the disease, which is now pursuing its ravages in all the joints of the upper extremities, having for the present got through with the lower ones. Her general health is good, but before this trouble she was delicate and dyspeptic. Massage every other day for six weeks, though removing the periarticular swellings and thickenings and extending the knee-joints a little, which are almost bent at a right angle, has had no apparent effect except to make the joints lame and sore and the patient tired. The upper extremities are almost ankylosed and resent passive motion. The patient perceives no improvement from the massage. This is the most discouraging case I have yet encountered. After the disease has spent itself on the upper extremities there will probably be a chance for massage to do some good.

By means such as we have been considering Fuller, of London, has told us that, when the contracted tendons seem almost to require the surgeon's knife for their relief, operative interference will often be rendered needless. In one case, by persevering for nine months, he straightened a leg that had been flexed for four and a half years. Indications for encouragement he clearly expresses in these words: "When, as is usually the case, the contraction depends upon simple gluing together of the structures external to the joints, with the thickening of the capsule, and possibly some remains of effusion within the cavity or into the bursæ external to the joint, I see no reason for despair as to straightening the limb, however long contraction may have existed."

Case VIII.—Rheumatoid arthritis of a single joint resulting

from injury is recognized. In one case of this kind, where the knee-joint had been injured ten years before, and there were thickening, grating, slight deformity, and shortening, but free motion, though walking was exceedingly limited on account of pain, weakness, and the great weight of the patient, she had been rubbed an hour a day for a year by a very nice person, with the result of always being tired after the procedure and getting no better. Twenty minutes' massage with carefully increasing resistive movements every other day for two weeks improved her walking to an enjoyable extent. The induration was lessened and the comfort of the joint increased.

A gentleman sixty-three years of age, who had had a fall five months before, came to see me on crutches. He had atrophy and relaxation of the quadriceps extensor from rheumatoid arthritis of the knee-joint, the result of his accident. There was slight subluxation of the head of the tibia backward, some thickening of the capsule and periarticular tissues, and dry crepitation on motion. He could not raise the leg extended either in standing or lying, but after three massages in one week he could elevate the whole limb extended at the knee for a second, and after five weeks' treatment he could hold the leg extended for nine minutes in the horizontal position. The periarticular tissues had improved, the muscles had gained in size and firmness, but the joint-surfaces had not improved, though he had got rid of "catches," and went without his crutches at the end of seventeen days.

Father D., twenty-seven years of age, always strong and wiry. When a boy he had trigger-finger of the right middle finger. This disappeared when rheumatoid arthritis in the shoulder-joints began, ten years before he came to me, and which was, no doubt, caused by straining the shoulders by holding himself too long on a crossbar in the gymnasium. Both deltoids were atrophied and whipcord-like. He could dress and undress with difficulty, and there was much crepitation in the shoulder-joints. He could elevate the upper arms to about seventy-five degrees from the perpendicular plane of the body, and on pulling back the left humerus its head slipped forward half way out of the glenoid cavity. He discovered sooner than I that massage and movements were of benefit to him, and he kept them up for four months with the result that he could raise his humeri one hundred and fifteen degrees from the perpen-

dicular. His deltoids had increased much in size and suppleness, and the shoulders were much more comfortable, so that his gesticulations as a clergyman had become easy to him. That no weight need be borne upon the shoulder-joints is perhaps a favorable circumstance for treatment in this condition.

No description of the effects of massage in rheumatic gout would be complete without reference to the case of old Admiral Henry. In 1810 he was seventy-nine years of age and had suffered from this affliction for twenty-eight years. There were swellings of his knees, ankles, and insteps which made him quite a cripple and his fingers were also swollen and contracted. His stomach and bowels were hard, painful, and disordered. By means of various instruments made of bone polished smooth and hammers covered with cork and leather he persevered in the use of deep friction and percussion night and morning for three years. At the end of this time, it is said, he had completely succeeded in removing the swellings and had restored himself to the use of his limbs. His operations were at first painful, but ceased to be so after a little while, and soon they became so pleasant and useful that after having gone through with them in the morning he felt better all day. At the age of ninety-one he wrote to a friend: "I never was better, and at present am likely to continue so. I step up and down stairs with an ease that surprises myself. My digestion is excellent and every food agrees with me. I can walk three miles without stopping." This was in 1823, and he may be alive yet for anything I know.

The admiral's pathology and therapeutics are of interest. He considered the chief cause of disease to be deficiency of circulation, and the best means of correcting this to prevent the nerves and muscles from falling asleep and getting fixed, for which purpose they should be kept loose by instruments worked among them. "By keeping the blood-vessels, nerves, and tendons in constant action by means of these instruments the blood is rendered pure, it passes quickly through the blood-vessels, leaving no *fur* behind it, so that ossification and stiffness are prevented." This quaint remark about the blood leaving no fur behind it is a noteworthy illustration of how a layman may express himself better than he is aware of, or, in common language, "hit the nail on the head." This *fur* of old Admiral Henry corresponds to what we know of

the white blood-corpuscles which move along so slowly in the circulation, having a tendency to adhere to the walls of the vessels, and which, when the current is retarded, as in points of inflammation, congregate in vast numbers and often migrate into the extravascular tissues, thence to be reabsorbed or become the foci of pathological changes.

In two cases of rheumatoid arthritis Zabludowski obtained marked improvement from massage, one of these, in a recent case, apparently recovering. In two other cases of arthritis deformans of single joints from injury benefit resulted from massage and passive motion to the extent of the patients being able to resume their occupations.

"The consequences of distortions and chronic rheumatic joint-inflammations yield to the usual methods of treatment so slowly that one must be glad to have such a method as massage at his disposal, by which they come to an end comparatively quickly. Practice in the manipulations, time, perseverance, and personal interest in the matter are necessary." So says Professor Billroth, of Vienna.

XXVI.

Massage and Galvanism in Gout.

"For thine own bowels . . .
Do curse the gout, serpigo, and the rheum."
—*Measure for Measure*, Act III., Scene 1.

The position which massage should hold in the treatment of gout has not yet been clearly defined. This will doubtless prove an interesting and fertile field to cultivate for those who have the opportunity, the time, and the inclination to do so. At present, as in many other affections, patients suffering with gout are often consigned to the hands of the *masseurs* to follow their own discretion or indiscretion.

On March 26, 1895, the Hon. H. D. H. sent for me. He was then fifty-one years of age, and his usual weight had been three hundred and twenty-five pounds, but at that time it was only about two hundred pounds, showing how much the poor man had been pulled down. For three weeks before I saw him he had been confined to his room with gout. The outer aspect of the left ankle was swollen, hot, tender, and indurated, so that he could only hobble around on crutches. On the back of the left wrist there was also a good deal of indurated deposit, hot, and sensitive to pressure, and both ankles and wrists were painful all the time, worse at night, so that he was wakeful and restless, seldom getting any sleep before two o'clock in the morning. Foot and hand were both œdematous and there was much pain in the great-toe joint, though there were no other symptoms here during this attack. His previous attacks, extending over a period of twenty-eight years, with the exception of the first, have all been characterized by heat, pain, and swelling of the metatarso-phalangeal joint of the great toe of the left foot, and these have all disappeared, leaving no trace in the intervals when he was perfectly well. On the back of the right hand there was a deposit half the size of a hen's egg and seemingly as hard as bone. These swellings were so much worse than usual that his physician called a surgeon to see if they had better be operated upon. It was decided not to do so.

I gave this patient general massage in the morning, and special massage of the affected joints late in the afternoon, every day for five days, when it was evident that he was improving. I also bandaged the left ankle and wrist, which afforded much comfort and support in the day. On the afternoon of the fifth day, immediately after massage to the swollen places, I gave each of them galvanism, five to ten milliampères, with the negative pole over the affected region, for a few minutes. The effect of this was evident at once in lessening the induration and dispelling the surrounding œdema and congestion. Followed by a few minutes of massage to push along the circulation and to hasten absorption, the result was much better than from either alone. This was continued every day for a while, with rapid improvement, so that on the seventh day, two days after the galvanism was begun, he was taking some steps without crutches, and two days later was walking well and attending to his profession—that of law—for half a day at a time. Under galvanism, preceded and followed by massage, the indurations and swellings disappeared like snow before the sun, so that in six days of this combined treatment there was scarcely anything left of them. In four weeks he got completely over one of his worst attacks and required no more treatment of any kind. Milder attacks usually lasted about the same length of time.

There were several other interesting features in this case. When I began with him he had exhausted the orthodox antigouty and antirheumatic remedies and was *quacking it on his own hook*. At my suggestion he stopped this and took an alkaline chalybeate water from Blue Hill Spring, Maine, of gentle aperient and diuretic properties, much like that of Schwalbach, and this alone took good care of the internal organs.

He could always tell when an attack of the gout was coming by his increased mental activity and facility of pursuing difficult legal cases successfully. His attacks were more frequent in strawberry and peach time, of which fruits he was very fond. When I first learned of the use of the negative pole of the galvanic current for aiding in the removal of deposits and indurations about joints I confess I was somewhat sceptical, inasmuch as it was also recommended that the electricity should be preceded and followed by a good massage. It seemed to me that the electrotherapeutists wanted to borrow some honor and glory from massage. But having

used galvanism in a variety of these cases from different causes, I no longer doubt its value when employed in this way. Whether it acts by attracting alkaline fluids to the negative pole and thus dissolving new formations, which would be very plausible in gout, or whether it works in some other way, its efficacy is undeniable. My distinguished patient was so pleased with the efficacy and novelty of this treatment that, lawyer-like, he advised me to keep it to myself. There might be equally good reasons for considering this a case of rheumatism as of gout. But it is not the object of this chapter to go into a differential diagnosis.

That distinguished authority on gout, Sir Dyce Duckworth, says: "The adage of Sir William Temple that 'no man need have the gout who could afford a slave to rub him' I believe true. As this diplomatist was our minister at the Hague when Boerhaave was a youth, it is not unlikely that the latter may have heard of the recommendation, and so been led to advise friction in the treatment of gout."

Our learned friends in France tell us that in chronic gout the good effects of massage are generally recognized—but opinions differ as to the best time to use it. M. Lécorché, M. Bouchard, and M. Gendre recommend massage after the acute stage, in order to combat muscular atrophy, to favor the resorption of infiltrations, to break up the tophaceous concretions, and to oppose fibrous ankylosis. During an acute attack it is well to abstain from using massage. M. Rosenblith, however, claims to have obtained good results from massage in seven cases of acute gout, but his opinion is not shared by his *confrères.**

The London *Lancet* of October 2, 1897, sounds a note of warning on this subject. It points out that the gouty kidney is seldom or never quite equal to its functions. Here it thinks that an unqualified and over-enthusiastic *masseur* might do much harm as he goes ploughing away at muscles infiltrated with uric acid, creating as much waste as a brisk six-mile walk, and more than the kidneys can throw off. Kept up from day to day for weeks, this practice may be destructive to an already damaged kidney, and the patient may find that though he has got rid of a certain amount of pain and acquired a comparative ease of movement, yet this may be at

* Revue d'Hygiéne Thérapeutique, 1896, p. 188.

the expense of renal incompetence and eventual uræmia. On the Continent this is said to be of frequent occurrence where massage is practised with more zeal than knowledge.

"We have allowed the quacks to get ahead of us in the application of electricity to therapeutics," said Dr. Anstie a long time ago. "The same must with equal truth be said of massage," says the editor of the *Lancet*.

In gout and many other affections where massage and electricity are to be used it would seem better that they should be applied by a physician rather than by the gymnastic *masseur*.

XXVII.

Massage of the Head, Face, Eyes, Ears, and Throat.

ITS EFFECTS UPON MUSCULAR ASTHENOPIA, HYPERÆMIA OF THE RETINA, BLEPHAROSPASM, AND GLAUCOMA—UPON CHRONIC INFLAMMATORY PROCESSES OF THE ANTERIOR SEGMENT OF THE EYE AS EMPLOYED BY EUROPEAN OCULISTS, ETC.

"*Othello.*—I have a pain upon my forehead, here.

"*Desdemona.*—Let me but bind it hard, within this hour it will be well."

. . . . . .

"*Iago.*—My lord has fallen into an epilepsy; this is his second fit; he had one yesterday.

"*Cassio.*—Rub him about the temples."

To most people massage of the head is highly delightful, more agreeable, indeed, than on any other part of the body to which it is applicable, and in various disturbances as beneficial as it is pleasant. To account in great part for this increased comfortable sensation we need only remember the acutely sensitive condition of the terminal filaments of the fifth pair of nerves, and that they will show signs of sensibility under circumstances in which spinal nerves would make no response. But massage of the head is seldom attempted, for manipulators are so accustomed to grasping muscular masses that, when they cannot do this, as on the skull, they are apt to think that nothing can be accomplished. Even Estradère is of the opinion that massage of the head is of little use, for no other reason, evidently, than that he is at a loss to know how it can be done. When manipulation of the head is attempted, it is usually, I might say almost always, in a way that would be better described by the word shampooing than by any other. Save with moisture for the purpose of cleanliness such a procedure had better be omitted; indeed, most people would object to such dry rubbing on account of its "setting their nerves on edge." The soothing influence of gentle stroking or of the hair being combed by another would be preferable. But the idiosyncrasies that cannot tolerate the following manner of doing massage upon the head are very rare.

With the patient in a semirecumbent position in an easy-chair that does not rock, the head inclined towards the side on which the

FIG. 54.—First position of the hands in massèing the head.

FIG. 55.—Second position of the hands in manipulating the head.

operator sits or stands at a suitable distance to give his arms free play, one hand will be placed over the temporal muscle and fascia and the other, if the manipulator be a novice, on the frontal region to steady the head, then the pressure of the hand on the temporal region is instinctively graduated to give the greatest movement of the scalp and underlying tissues between it and the bone, without gliding of the hand or such vigorous compression as hinders motion. Three or four manipulations will be made in this way and proceeded with step by step, the advance overlapping one-half of the region just worked upon, until the occiput is reached, and the whole can be repeated several times. After this the other hand can be trained to make similar movements in an opposite direction, proceeding from the superciliary ridges over the top of the head, upon the occipitofrontalis to the nape of the neck (see Figs. 54, 55). A good *masseur* ought to be able to keep both hands going on these regions at the same time, one contracting as the other relaxes, without scraping, scuffing, shaking the head, or turning a hair. The manipulator, having done one side of the head and the region bounded by the occipitofrontalis, will find it most convenient to step to the other side of the patient and proceed as before. The back of the head can be more thoroughly *masséed* with the head erect, one hand steadying it on the frontal region, while the other makes manipulations in an oval direction, the long diameter of which is horizontal. At the middle of the upper portion of the back of the head, the centre from which the hair sheds off in all directions, a spiral circular movement with the palm of the hand is agreeable, efficacious, and useful.

Upon tough scalps that cling closely to the skull massage is very hard work, and all the available motion that can be gained will often be by means of the ends of the fingers, and this only of slight extent, proceeding in the same direction as when longer sweeps can be made. In such cases, when the hair is long and thick, by running the fingers through it close to the scalp, additional support will be afforded, which will secure more effectual manipulation by their palmar surfaces and prevent friction. An excellent way and pleasant to the patient to finish massage of the head is to place one hand on each side of it and make simultaneous manipulations away from the median line from before upward and backward. The groove between the occiput and back of the neck should receive

special attention by accurately adapting the palmar surface of the fingers to it as far as the median line, first on one side and then on the other, and making upward and forward manipulations. Downward and backward manipulations have but little effect here, though they may be used advantageously with the thumb over the mastoid processes.

With such modifications as will readily suggest themselves, the head can also be well manipulated while the patient is lying down, and gentle stroking with light percussion can frequently be added with advantage. The manipulator who fancies he can sit behind a patient and find the "scalp loosely connected to the underlying skull" for his convenience of doing massage in this disadvantageous manner will find himself at fault both in his position and supposition.

In *masséing* the face of a fat patient the tissues can only be rolled and stretched under the fingers and palm away from the corners of the eyes and alæ of the nose towards the angle of the lower jaw (see Fig. 56); but if the patient be moderately nourished or thin, the cheeks can be grasped between the thumb and fingers and more thoroughly squeezed and *masséed* in the same direction. The eyelids can be effectually and agreeably manipulated by pinching them up with a rolling grasp by means of the forefinger and thumb at right angles to the orbicularis palpebrarum, and stretching the enclosed fold away from the canthus to which it is nearer. With one thumb closely adapted to the inner portion of the supraorbital arch and the middle finger of the other hand a short distance below it on the upper and bony portion of the nose, useful stretching in opposite directions and away from the inner angle of the eye can be made and should be simultaneous. (See Fig. 57). Moving the thumb one step farther along, so as to include the whole supraorbital arch, all the tissues upon and immediately beneath it can be advantageously stretched upward and outward at the same time that the lower lid is pulled down by one or two fingers of the other hand by carefully graduated pressure upon the lower margin of the orbit. (See Figs. 58, 59.) The alæ of the nose, one at a time, can be stretched and manipulated by covering the end of the finger introduced internally with a fold of soft handkerchief. By putting the index-finger, still covered by a fold of soft cloth, inside of the cheeks, these can be squeezed, manip-

FIG. 56.—Position of the hand for massage of the cheek, while making alternate manipulations with the other hand on the forehead.

FIG. 57.—Stretching the tissues away from the inner corner of the eye.

FIG. 58.—Stretching the tissues above and below the orbit.

FIG. 59.—Third step in stretching the tissues above and below the orbit and away from the outer corner of the eye.

ulated, and stretched between the thumb and finger, observing carefully not to lacerate the bridles of mucous membrane.

These manipulations seem easy enough to describe and to do, but nowhere in using massage is more practice and skill required than upon the head, face, and around the eyes.* Let anyone practise them for a dozen years, and he will find that he can do them more easily and effectually the last year than he could the preceding one. The highly skilful and ingenious originator of lithotrity at a single sitting evidently took more pleasure in telling how much better he could pass a catheter this year than he could a few years

FIG. 60.

An absurd, useless, and childish way of stroking the forehead, figured in some books on massage.

ago, than he did in demonstrating his valuable discovery of the toleration of the bladder and the manner in which he took advantage of it. Professor Gross was much more satisfied in showing his pupils how to make a poultice than how to amputate at the hip-joint.

But what is the use of all this massage of the head? Its use and benefits may be as extensive as a morbid influence acting on the fifth pair of nerves is injurious. It is a plain saying, but a true one, that it is a poor rule that does not work both ways, and

* Since the publication of the first edition of this book I have been surprised to find that this method of *masséeing* the head and face is not understood nor practised outside of the city of Boston, except by some pupils whom I have instructed. Even in France and Germany the prevailing method is by stroking and percussion, much the same as the crude ways of the magnetizers.

we see no reason why an agent like massage, that favorably influences the circulation, nutrition, and sensation of the branches of the fifth pair accessible to its impression, should not manifest its benefits in as many different ways as an injurious influence does in other ways. Brown-Séquard enumerates no less than eleven different affections of the eyes that may arise from a supra- or infraorbital neuralgia, in illustration of the general rule that "the same peripheric cause of irritation acting on the same centripetal nerve may produce the greatest variety of effects, including every functional nervous affection or disorder." * Besides, the acute sensibility of the trigeminus, its influence over nutrition, taste, and smell, and by its anatomical relations, it is also surmised, over hearing, must not be lost sight of in considering the effects of any therapeutical agent applied to it. We have already referred to the effects of massage of the head in relieving peripheral neuralgias, and sometimes also those of central origin, and there is every reason to believe that deep-seated neuralgic pains in the periosteum, bones of the skull, dura mater, frontal sinuses, and orbits are likewise relieved by the sympathetic effects of massage, extending from the external branches of the fifth pair to those supplying the more deeply situated structures. A study of the effects of massage upon the head would extend, therefore, to a study of the anatomy, physiology, and pathology of the fifth pair of nerves. We must content ourselves by indicating its results. These are not obtained by the random use of massage, for just as we have a sense of healthful and health-producing harmonies of sights, sounds, tastes, and odors, so also are we possessed of the faculty of perceiving agreeable sensations and motions conducive to our welfare, and nowhere upon the body where massage is applicable are its sensations and motions so quickly perceived to be in or out of harmony with the feelings of the patient as upon the head. Even when tissues are tough, matted, and sore, here and elsewhere, patients of sense will often speak of the agreeable hurt of vigorous massage, and when this has ceased with returning suppleness, they may think that they are no longer being benefited. Aside from the effect of massage, perhaps no better illustration of healthful and agreeable impressions upon the fifth cranial nerve can be given than those arising from

* Lectures on Functional Nervous Affections.

cool breezes on a hot day, which impart to the brain a sensation of comfort and excite in return reflex acts of breathing. The strength of massage and the number of intermittent squeezes upon the head have much to do with the result; the former has already been indicated, the latter should be about sixty per minute with each hand for the majority of cases. If it be desirable to *masser* the head in giving general massage, ten minutes will suffice; but if the head require special massage, twenty or thirty minutes may be occupied.

The subjective effects of massage of the head are, in general, extreme comfort with a tendency to go to sleep, which, strange as it may seem, is equally consistent with an aptitude for mental work,* freedom of respiration through the nostrils and light, clear feelings taking the place of dull, heavy ones. Increased suppleness of the scalp and tissues generally would seem to be the objective effect of massage which often precedes improvement in detail of more important character, the most immediate and apparent instance of this being relief of congestion of the Schneiderian membrane and the ease of expelling tenacious mucus. The deep lymphatics of the face are derived from the pituitary membrane of the nose, and that these can be made more permeable by means of massage will account in great part for the resulting freedom of respiration through the nostrils when they have been obstructed and congested. Division of the fifth pair causes the nasal mucous membrane to swell and so disturbs its nutrition as to destroy the power of smell, the passages becoming obstructed by accumulated mucus. Pressure of effete matters upon the terminal branches of the fifth pair would seem to have a similar influence, but to a less degree, and this pressure can be removed to a marked extent by means of massage. Then it need hardly be repeated that increased circulation in the external tissues of the head will do something towards relieving congestion in more deeply situated parts.

It is a familiar but curious fact that almost everyone instinctively rubs and presses the forehead when perplexed and annoyed or when suffering from mental pain and distress, and usually with relief. A satisfactory explanation of this has hardly yet been afforded, but it has been suggested that the nerve-force liberated

* An eminent lawyer of this city always had his head rubbed before arguing a case in court.

by the increased activity of the anterior convolutions of the brain during active thought is transmitted from the cortical centres to the muscles at the root of the nose and above, and occasions that feeling of tension that is undoubtedly relieved by rubbing.

According to Pincus * idiopathic premature baldness running from the vertex to the forehead between the parietal protuberances is very common in men. Microscopically he has found an increase of the connective tissue of the cranium and a binding of this tissue to the layers beneath, which exerts destructive compression on the roots of the hair. Massage is certainly indicated in this condition, and ought to be beneficial if applied before the roots of the hair have been destroyed.

Besides the influence of massage of the head in relieving pain and headache of neuralgic, rheumatic, and sometimes of central origin, the most striking results I have obtained were in the relief of muscular asthenopia. My experience can perhaps best be spoken of by referring to four cases, one an emmetropic, one a hypermetropic, one a myopic, and the last a myopic and astigmatic patient. They were cases of long standing, all in good health and not in any way run down, and had had their refraction attended to by competent ophthalmologists. Inasmuch as they had had good use of their eyes before, under apparently the same circumstances, why should they not again? Massage of the head, and more especially around the temples, forehead, and eyelids, *but not upon the eyes,* produced marked and permanent improvement preceded by returning elasticity of tissues. I will only refer to the patient afflicted with myopia and astigmatism who came to see me in 1878 to ask me about trying massage. She was the worst of all four, and the one in whom the least improvement resulted. With concave cylindrical glasses she had had good use of her eyes for many years until within the last six years, the trouble coming on from the time that she strained them "sight seeing" in Europe in side lights, poor lights, and all kinds of lights. I told her massage would probably relieve the strained, uncomfortable feelings, but that this would only be temporary unless she had appropriate spectacles. By the crude test of revolving each glass in front of the other eye than that to which it had been adapted I found that better vision could

* Berliner klinische Wochenschrift, Nos. 4 and 5, 1875.

be obtained, and sent her to an oculist without attempting massage. This physician told me that the case puzzled him, but he thought the trouble was mainly due to insufficiency of the internal recti. He gave her other glasses, treated her with prisms, and watched over the eyes carefully for four years, during which there was some improvement. But at the end of this time the patient decided to try massage, as she still suffered from tired, hot, uncomfortable feelings in her eyes with supra-orbital neuralgia, lasting for several hours after every attempt to use them for fifteen minutes in sewing, reading, or fine work of any kind. After one application of massage the eyes felt more comfortable and she could use them a little more easily. Of course, this was but temporary, still, it was a good omen. After four massages tenderness and slight swelling over the left temporal region had disappeared. She had seven massages in one week in August, 1882, and in November she returned to me, for she felt that she had been somewhat benefited, though slightly. From November 15 to December 7 she had nine massages, and then at the end of this time she could use her eyes for an hour at a time in sewing, knitting, or reading with impunity. In December and January her visits to me were few and far between, and there was no more gain. From the middle of February to the middle of March she had twelve *séances,* usually going to the theatre after them, and still, as might have been expected, there was no more apparent advance. She had several more massages with a little more encouragement—in all thirty-seven sittings. One year later I saw this patient, and she reported that her eyes had been much relieved from restraint and discomfort by the massage, that she had been able to use them longer and more easily, and that when hot, tired, and uncomfortable they recuperated much faster, and that this improvement was still continuing.

When this patient's eyes were comfortable before massage, they felt stirred up and uneasy for an hour or two afterwards, but after the perturbation had subsided they were easier than before the manipulation. If they were heated and tired before the massage, they felt cool and comfortable after it, and this is usually the case. When massage was begun her scalp was as tough, matted, and inelastic as sole-leather, and it is not unlikely that this absence of suppleness extended to the areolar tissue and muscles of the orbit, especially to the internal and inferior recti. This state may have

been a reflex effect of straining the eyes. Evidently its continuance must have had an unfavorable reaction in perpetuating the mischief, besides the disturbance it occasioned by its pressure upon terminal nerve-filaments and the hinderance to circulation, absorption, and nutrition. In such cases, and notably in this when the patient was asked to look upward while the lower lid was being pulled down by pressure on the inferior margin of the orbit, she would make but a feeble effort, owing in all probability to stiffness of the tissues beneath the eyeball and weakness of the muscles above; when asked to look downward while the upper lid was being raised by pressure and extension on the upper margin of the orbit the same feeble effort was observed, the eyes quickly rolling upward, unable longer to bear the extension of the tissues above them. Such movements on the part of the patient, together with the counter-extension of the manipulation (see Figs. 61, 62), are diagnostic and therapeutic at one and the same time, and I think clearly indicate that the condition of the tissues between the eyeball and the walls of the orbit is similar to that found externally. In one of my cases of muscular asthenopia, however, the inability to look up or down against counter-extension of the lids was associated with almost natural suppleness of the external tissues of the head and face. This was the hypermetropic patient, an astronomer, and he improved so that he could see stars in the daytime (without falling on the sidewalk) and read columns of newspapers. The practice of counter-extension for relaxing and elongating the tissues within the orbit is at first very disagreeable to the patient, but later becomes pleasant, restful, and refreshing to the eyes. It is to be expected that the conjunctiva as it passes from the lids to the globe partakes in shortened growth with the other tissues. This must seem like curious pathology, but is it not consistent with similar conditions in other parts and with common-sense? Upward and outward movements of the eyes in such cases cannot but be highly salutary in relieving the weakened and overstrained internal and inferior recti muscles, and I advised these patients to practise them several times daily. Turning the eyes in these directions tends to restore the harmonious distribution of will, nerve, and muscular action. Gymnastics with prisms to make the internal recti contract vigorously may be exceedingly beneficial, but I fail to see the philosophy of exercising muscles already overtaxed, at least until time

FIG. 61.—Stretching the lower lids downward while the patient looks up.

FIG. 62.—Stretching the tissues above the orbit while the patient looks down.

for rest has been allowed. The conditions here seem to me to be quite analogous to those in writer's cramp and allied affections, over-use of any set of muscles giving rise to similar symptoms in those predisposed to them. Before resorting to division of the external rectus for the relief of muscular asthenopia, it might be well to try massage. An interesting form of passive motion is that recommended by Professor Michel in the *Monatschrift für Augenheilkunde,* November, 1877, for ocular paralysis. This treatment, which succeeded in a case of rheumatic paralysis of the abducens, consisted in seizing the insertion of the affected muscle with a pair of forceps and gently drawing the eyeball as far as possible in the direction in which the muscle would move it, afterwards bringing it back to its former position, this manœuvre being repeated for about two minutes every day.

But to return to the astigmatic patient. In seven days with seven massages there was some improvement in the inert rigidity of the external tissues of the head and face, and long before massage was left off the tissues of the scalp, face, and temporal region had improved in suppleness and elasticity to their utmost capacity, and the patient could look up and down to a normal extent while stretching was made upon the lids in an opposite direction. There was accompanying improvement in the use of the eyes, but not to a corresponding degree, though this improved after massage was over.*

Dr. Henry B. Stoddard tells me that he has treated successfully by massage of the head and face a case of muscular asthenopia of a year's duration in an emmetropic patient who had for a while been treated in the most approved manner without benefit.

Besides a few cases of chronic hyperæmia of the conjunctiva that had been rather defiant of orthodox means, in which massage brought some relief, I have seldom ventured to try this remedy in ocular affections. Mr. W., suffering from hyperæmia of the retina, was sent to me in 1870 by Dr. Dyer, then of Philadelphia. Several years before he had had one eye removed, as it had been severely injured and gave rise to sympathetic ophthalmia in the other. Massage of the head, face, and eyelids proved an effectual

* Dr. Henry W. Williams, of Boston, expressed an unfavorable opinion upon tenotomy of the external recti in insufficiency of the internal, as it has not proved practically useful in his experience.

revulsive and relieved the irritability of the eye, to the patient's great satisfaction. The ophthalmoscopic appearances as observed by Dr. Dyer corresponded to the patient's feelings of improvement. The patient had frequently been troubled with hyperæmia of the retina before, but in his estimation he never got such prompt and complete relief as he did from massage. He was a gentleman of keen observation, in good health, and actively engaged in business.

In this case unnatural tension and toughness of tissues becoming supple was an accompaniment of improvement agreeing with the other signs. The tissues on the side of the head from which the eye had been enucleated were literally devitalized, tough, dry, tense, inert; on the other side less so. This brings me to say that the natural physiological action of any organ is essential to keep it and the adjacent tissues supple and healthy. So marked and constant is this that it can even be perceived by cultivated touch where there are only slight defects of sight and hearing and no other external symptoms of derangement. I like no better amusement amongst my medical friends than to feel of the tissues of their heads and faces, and in this way alone see how often I can ascertain which is the better eye or ear. I may with safety say that I have been able to judge correctly in at least eight cases out of every ten. In one case the difference in hearing between the two ears was so slight that the patient himself could not at first tell which had been affected many years before. In order not to mislead him or myself I wrote my decision on a piece of paper, and after careful experiment the paper was read and found correct.

In a case of far-advanced *glaucoma,* where one eye had already been operated upon, but too late, and it was not thought worth while to attempt iridectomy upon the other, I used massage every other day for four weeks, during which there was a stay in the course of the disagreeable proceedings, the neuralgia was relieved, and the patient made much more comfortable. It was impossible to keep up massage longer, and the unpleasant symptoms returned after it was left off, and hence we were led to think that it had been useful. This was in 1876 (as the physician and relatives of the patient can testify), before Pagenstecher and other foreign oculists had demonstrated the influence of massage in diminishing intra-ocular pressure.

In the only two cases of distressing and long-continued involuntary twitching and contraction of the eyelids in which I have tried massage it proved successful. The mode of procedure was massage of the head and manipulation and stretching of the orbicularis. One was a military man whose nervous system was somewhat run down. The fits of twitching disappeared after a few massages, long before the tone of his system returned under general massage. The other case I have just finished. It is that of a lady, fifty years of age, in good health. For seven or eight years she had been troubled with twitching of the lids, particularly the lower one of the right eye, and also the muscles of this side of the face and occasionally also of the left hand and foot. The involuntary movements were growing worse when she came to me, and at times closed the lids. The twitching first came on soon after severe mental trouble which still continues, and this did not make the prognosis favorable. To make matters still worse, she had been wakeful for four or five years, often not getting any sleep till four o'clock in the morning, and was sometimes awake all night. Massage of the head and face with stretching of the orbicularis and muscles of the face alone were used every other day, and after four *séances* the involuntary movements were scarcely perceptible for thirty-six hours. The effect not lasting from one massage to the other, forty-eight hours, we tried manipulation every day for a while with better result, and later gradually lengthened the intervals to a whole week. The patient had massage at three o'clock in the afternoon, and after five massages she felt drowsy in the evening for the first time in her life. Sleep soon became natural and easy, and the convulsive twitching almost entirely disappeared. Against loss of sleep and continued mental anxiety this result is better than could have been expected.

Similar to these two cases, Dr. Ch. Abadie, in *Gazette des Hôpitaux,* 116, 1882, reports the following: A man, forty-five years old, had suffered for about ten years from blepharospasm of the left eye, which had been treated without result. Neurotomy was proposed but declined. It was decided to try massage. The orbicularis was strongly stretched so that the skin and underlying tissues were acted upon. The sitting lasted six to seven minutes, the next, on the second day, ten minutes. In like manner the procedure was repeated for three weeks, at the end of which the lid

of the affected eye obeyed the will as well as the other. In another case, a young man, the affection had lasted one year, and he was cured in this way in two weeks. There was no result from massage upon an old woman who had suffered from intermittent spasm of both lids for a long time so severely that during the cramp the lids could not be opened. Romberg states that direct pressure upon the facial nerve at its exit through the stylomastoid foramen will stop the blepharospasm in some instances.

Until quite recently the history of massage has presented but few instances of this agent having been used in affections of the eyes, and the results claimed have been so extraordinary that they will not gain easy credence without further confirmatory testimony by those best qualified to judge. M. Sabatier, physician and surgeon, in his "Traité Complet d'Anatomie," published at Paris in 1781, gives several observations analogous to the following: "Valsalva by his report confirms my conjecture, and I add it here to show that the ordinary resources of the art of healing were not used successfully in the following case. A woman was injured in one of her eyes by a turkey which she wished to capture. A little blood flowed from the wound. The sight of the eye was lost immediately. Many remedies were employed without relief. The patient then came to Valsalva, who could perceive no external nor internal lesion of the eye. Reflecting upon this case, he imagined that by making vigorous frictions upon the course of the frontal nerves a beneficial change might be produced in the eye. Scarcely had he commenced them when the patient recovered her sight. He attributed this success to cessation of spasm, which he thought affected the muscles of the eye, and to the setting free of the optic nerve, which he supposed had been strangled." But it is more probable, Sabatier thinks, that it was due to the sudden shaking (*ébranlement*), molecular disturbance of the nerves of the eye. The reader may take this testimony for what it is worth. In those days it could certainly come from no higher source than Valsalva, who was a pupil of Malpighi and later master of Morgagni. He was also professor of anatomy at the University of Bologna, which under his direction acquired great celebrity as a school of medicine.

Old Admiral Henry, whom we have already referred to, is a never-failing source of wonder to those interested in massage. In 1782 a cataract began to form in his left eye, but was unheeded

until formed. Against the protestations of his friends, he was led to rub the eyeball over the closed lids. He thought the eye was the better for it, and in hopes of dispersing the cataract he began perseveringly to use the round end of a glass vial. (It is a mercy it did not break.) Some time afterwards there was improved vision. He continued the practice, and in less than two years the cataract had disappeared and vision was again good in this eye. Two years later a cataract came in the other eye. It was operated upon by a distinguished oculist in London. Inflammation set in and the eye was lost, but useful vision was still retained in the other eye. After the operation the admiral suffered from excruciating facial neuralgia, which extended to the eye that had been operated upon, and this reduced him to a state of great weakness. After having used various remedies with but temporary relief, he tried deep rubbing, and thus got rid of his pains.*

I have heard of other cases of cataract disappearing under massage, but my enthusiasm has not yet been sufficiently aroused to try such means. While waiting for the necessity of an operation, massage in such a case would be a harmless and luxurious experiment, and if the patient could afford it and be responsible for the want of result, it might be justifiable. The instances in which cataracts improve for a time, or even disappear of their own accord, are so exceedingly rare that improvement or recovery following massage would be just ground for encouragement from this source. Spontaneous recoveries are generally indications that nature can be artificially aided.

Chronic conjunctivitis, specks, and opacities of the cornea of small extent are said to have been cured with massage not directly applied to the eyeball by Neumann. (Roth, 1851.) It is to be regretted that Neumann was not an oculist and that he did not flourish in these days, for his experience has of late been confirmed by trustworthy ophthalmologists. These most careful, skilful, and scientific specialists have been the last to avail themselves of the use of massage. Its list of advocates in affections of the eyes is headed by the most distinguished of them all, Professor Donders, then follow Professor Mauthner, Drs. Pagenstecher, Klein, Just, Schmid, Rimpler, Pedraglia, Schenkl, Bull, Becker, Damalix, and

* The Anatriptic Art, by Walter Johnson, M.B.

others. Professor Leber in his prize essay of 1873 showed that the ways of resorption and flowing off of the intra-ocular fluids converge near the corneosclerotic margin, another instance, one might be disposed to think, that Providence had planned the eye, like many other structures, to be subject to the influence of massage. It has taken humanity a *mighty* long time to find it out. Professor Mauthner is of opinion that there is no organ so appropriate for the use of massage as the eye.* From numerous experiments and preparations Dr. Leopold Weiss, Docent at the University of Heidelberg, has demonstrated that there are four ways for the flowing off of the intra-ocular fluids running to the corneoscleral margin: First, by means of that first described by Knies, which runs backward to the outer surface of the sclera from the ligamentum pectinatum and interior of the sclera; second, by means of the vessels that penetrate the walls of the bulb at this place; third, along the course of the strong connective-tissue fibres which can be seen running from within outward; fourth, from the anterior chamber into the cornea, and out of this, opposite the margin of the cornea into the subconjunctival tissue. (*Centralblatt für praktische Augenheilkunde,* 1880, p. 87.)

At the Ophthalmological Congress held in London in 1872 Professor Donders called attention to the practice of massage as one that had given him excellent results in abscess of the cornea (the last affection in the world we would have supposed massage to be applicable to). The experience of Donders has been confirmed by Dr. Osio (*Independencia Medica* of Barcelona) and by Dr. Just (*Centralblatt für praktische Augenheilkunde,* June, 1881). Just observed that a speedy and easy absorption of hypopyon occurred when the pus was spread over as great a space as possible by means of a pressure-bandage. For this reason he attempted massage of the eyes by making gentle upward stroking and rubbing motion by means of a finger placed on the lower lid in order to disperse the pus over the whole of the anterior chamber. In this manner its rapid removal was obtained. By way of illustration he reports the case of a woman, sixty-four years of age, afflicted with *ulcus corneæ serpens, hypopyon,* and *blennorrhœa* of the lachrymal sac of three weeks' duration, to whom he applied

* Glaucoma, Wiesbaden, 1882: Bergmann.

massage night and morning, and after the fifth sitting the improvement had been so great and rapid that iridectomy for exudation into the pupil was not considered necessary, the ulcer had become perfectly clean, the cornea much clearer, and the purulent matter had entirely disappeared and did not reaccumulate. Such speedy improvement Just believes cannot be obtained in any other way, and he advises others to try the procedure.

Dr. Pagenstecher, of Wiesbaden, seems to have been the first ophthalmologist to use massage upon the eyeball after Donders had recommended it, but apparently independently of this recommendation. In one case that for twenty years had been subject to periodical attacks of inflammation of the eyes, presenting an affection of the whole sclera with uniform conjunctival and subconjunctival injection to a considerable degree, the conjunctiva of the globe slightly œdematous, with here and there at the margin of the cornea small round or oval prominences, not unlike the formations which are described as cystoid cicatrices, by the use of massage he succeeded in suppressing the attacks in their first stages. Immediately after the massage diminution of intra-ocular pressure was always observed in this and other cases. Pagenstecher also used massage in a case of episcleritis and in another of parenchymatous keratitis of specific origin. The episcleritis in the course of ten days was completely removed, having lasted for four weeks, and he never observed the like with other methods of treatment. The keratitis was in the stage of retrogression, but for a long time had been at a stand-still. After the use of massage for a few days a marked improvement in the power of vision was obtained. In these cases intra-ocular pressure was less after massage. His method of using massage was by moving the lids under slight pressure in a radial direction from the centre of the cornea, as quickly as possible, and after this by making circular friction under slight pressure upon the upper lid around and upon the region of the sclerocorneal margin. His idea was that massage might succeed in removing hinderance to the circulation, and in this he was not disappointed, as it emptied the blood-vessels and lymphatics at the sclerocorneal margin and thus promoted rapid absorption of exudation around them. This was Pagenstecher's early experience with massage, which was published in 1878 (*Centralblatt für praktische Augenheilkunde,* December). Three years later he gave his

more extended experience and results in the use of massage, and these were still very favorable.*

In brief, he found this treatment useful in chronic inflammatory processes of the anterior segment of the eye; contra-indicated when it is found to cause excessive injection, and especially if there be photophobia and lachrymation; and not to be employed in the presence of iritis. In some cases it acted as a depletive, lessening the tension of the eye; in others as a stimulant, aiding the formation of new vessels, and thus proving beneficial when nutrition and absorption were torpid. Attention is called to its stimulating effects on the vasomotor nerves, whereby a better contraction of the vessels resulted, though the immediate effect seemed to be that of dilatation, for after massage the eyes are still more injected, but on the following day this is less than before manipulation. The irritation produced must be of moderate degree and should wholly disappear in half an hour. He used massage once a day from two to four minutes, and sometimes twice daily when it was well borne. Affections of the cornea, conjunctiva, sclera, and ciliary body were those in which he found it applicable, namely:

1. Opacities of the cornea resulting from pannous keratitis, scrofulous superficial keratitis, and even parenchymatous keratitis. When, after corneal opacity has subsided, such opacities remain stationary, massage reëxcites a moderate vascularity and promotes removal of the opacity.

2. Chronic pustular conjunctivitis, especially in old people; also in forms of chronic conjunctivitis in which there is a hypertrophic thickening of the membrane close to the margin of the cornea, occurring either as an elevated yellowish wall surrounding the cornea, or as one or more thick vascular papules, towards which large veins course from the conjunctiva. A form of conjunctivitis, chiefly caused by external irritation, in which the inflammation occurs in a triangle with its base at the outer, rarely at the inner margin of the cornea, the membrane being swollen and of a grayish-yellow tinge and the conjunctival and the subconjunctival vessels swollen.

3. Forms of scleritis and episcleritis in which fixed nodules appear in or on the sclera, often accompanied with severe ciliary

* Archives of Ophthalmology, December, 1881.

neuralgia. Constitutional treatment is required in addition to the massage, and the latter is not employed if there be iritis. Massage appears to hasten the absorption of the nodule, chronic episcleral inflammation without iritis leading after long periods to alterations in the tissue of the sclera.

4. Circumscribed affections of the ciliary body. In the one case thus treated, a localized congestion of long standing in the upper part of the ciliary region, associated with extreme sensitiveness and pain after efforts of accommodation, was cured by massage.

Pagenstecher often uses a small quantity of yellow precipitate ointment under the lids, which makes them glide more easily in doing massage, besides distributing and dividing the ointment in the finest possible manner, so that its specific effect is greatly developed. The experience of Pagenstecher has been confirmed by several of the oculists mentioned, much to their agreeable surprise. He obtained the prettiest results in cloudiness of the cornea, whether superficial or deep-seated, partial or extending over its whole surface. He affirms that the usual means employed of clearing up the cornea, such as moist warmth, yellow precipitate, calomel, tincture of opium, etc., are far behind massage in celerity of action.

Dr. Pedraglia, of Hamburg, used massage and nothing else in two quite recent cases of episcleritis, in which the exterior parts of the bulb presented well-marked circumscribed redness of the episclera without any trace of pustules or affection of the cornea. Massage was used every other day, and after six times one case was discharged well, and after fourteen days the other was considered cured. In the one case after four and in the other after three massages the congestion had almost entirely disappeared and the disagreeable feelings of pressure had ceased. (*Centralblatt für praktische Augenheilkunde,* April, 1881.)

Panas used massage, and found it speedy, agreeable, effectual, and not painful. It rendered the best service together with precipitate ointment in chronic affections of the cornea in young people. In his hands it proved particularly effectual in parenchymatous and scrofulous keratitis and *pannus granulosus.* (*Centralblatt für praktische Augenheilkunde,* 1881.)

Gradenigo states that a patient of his who in the evening re-

quired narcotic injections entirely replaced these with advantage by massage of the eyes. Diminution of tension resulted, and pain and disturbance of circulation ceased. He also states that a decrease of tension occurs in healthy eyes from massage applied to them for two or four minutes, and at times pain will be felt, but this disappears and is followed by agreeable feelings. (The same journal, 1880, p. 123.)

Friedmann found massage of no use in *conjunctivitis phlyctenulosa vesiculosa*, but, on the contrary, it quickly cured *conjunctivitis phlyctenulosa miliaris*, and by using a little vaseline under the lids he found that cloudiness of the cornea cleared up quickly. (*Wiener medicinische Presse*, 1882, No. 23.)

Schenkl confirms the observations of Pagenstecher. He obtained the most favorable results from massage in opacities of the cornea in *keratitis profunda*, as well as pannous and maculous opacities of the most divers durations. He tried it in acute inflammatory processes, recent parenchymatous keratitis, in relapse from iritis, and in ulcer of the cornea, and found that it was well tolerated, but did not shorten the durations of these affections. In various forms of glaucoma the good effects of massage were only transitory, the diminution of intra-ocular pressure not lasting more than twenty-four hours. Secondary glaucoma was, however, an exception, for in such cases massage produced permanent improvement. Favorable results were obtained in hemorrhage into the anterior chamber and into the conjunctiva. He also used massage in other affections of the eyes, but the results are not stated. (*Prager medicinische Wochenschrift*, 1882.)

In the service of Professor C. E. Michel was a patient whose left cornea was hazy and there were three large, flat nodules over (probably under) the central part of the tarsal cartilage. The electrocautery being out of order, massage with yellow precipitate ointment was used instead. After two *séances* weekly for three weeks the nodules had decreased in size, so the cautery was no longer thought of and massage was persevered in. The cornea became clearer and the elevations scarcely perceptible. Another patient of Professor Michel's had trachoma for several years. This had almost disappeared, but the uppermost portion of the cornea was occupied by a mass of blood-vessels and the corneal tissue was infiltrated and elevated. Massage with ointment of yellow pre-

cipitate was used, and the cornea became perfectly smooth and almost as clear as the well one.

In 1876 Max Knies published his discovery that the angle of the anterior chamber is almost always found closed in glaucomatous eyes, and this fact became worthy of great consideration, in view of the previous observations of Professor Leber that the aqueous humor in the normal eye here finds its way for flowing off. Knies thought that the occlusion was owing to a primary inflammation, and in this he was confirmed by Adolph Weber. (*Centralblatt für praktische Augenheilkunde.*) Professor Mauthner is of the opinion that in the first stage of glaucoma its dangerous progress may be arrested by means of massage. ("Glaucom," Wiesbaden, 1882.) How vastly important it is even to arrest the progress of such a dangerous affection! I have previously stated that it is in the early and late stages of many affections that massage is most useful: in the early as a preventive, in the late as—well, that depends on the amount of injury done.

Dr. Karl Grossman reports favorably on massage in the interior of the eye in glaucoma. After paracentesis and the escape of the aqueous humor he takes a club-ended silver probe, previously shaped at the end like a button-hook, and passes it into the anterior chamber through the corneal wound; the convexity of the hook being directed to the ciliary region, he tries to push it gently but decidedly forward between the cornea and iris as far and in as large a circumference as possible. With the hook he gently presses the peripheral part of the iris back towards the lens, where a distinct resistance can be felt. This proceeding he repeats several times, and having done so in one quadrant, he turns the convexity of the probe round and goes to another. He is of the opinion that the improvement in three cases, one being desperate, in which he tried this must be attributed to a successful mechanical reopening of the iris-angle, which, once established, became permanent. Fears as to reaction and irritation were not realized. The operation eases the obstructed angle better than iridectomy and avoids the drawback of the latter, viz., deformity of the pupil. (*Ophthalmological Review,* London, 1882.)

As a means of hastening resorption of the lens after *discisio cataractæ,* Junge, Chodin, and Becker testify to the favorable influence of massage. According to Professor Junge, who had used it

for this purpose for four years prior to 1880, it is effectual in two ways: First, upon the region of the sclerotic, the substance of the lens in the anterior chamber is pressed out of the capsule; second, upon the region of the cornea, the substance of the lens is finely divided and made more fit for resorption. Only when all appearances of irritation have ceased does he make use of massage for one or two minutes every two or three days. (*Centralblatt für praktische Augenheilkunde,* 1880, p. 279.)

Dr. Van Der Laan has used massage of the eyes for traumatic cataract. A five-year-old child received a linear wound of the cornea and iris, and rubbed the eye frequently itself, with the result that in twenty-four hours the glaucomatous symptoms had disappeared and a great part of the swollen lens was removed from the pupil into the anterior chamber, from whence it was resorbed. (*Ibid.,* 1881, p. 449.) In this case permission to rub the eyes was probably neither asked nor granted. A person falls and injures a joint, resulting in its becoming stiff; again, the same person may fall, break the adhesions, and cure the joint; but they are quite as likely to break a limb, and so it would be if massage for affections of the eyes or any other organs were intrusted to the uneducated. But the teachings of nature are not to be neglected, for instinct is a great matter. Every time we wink the exterior of our eyeballs and the interior of the lids receive a sort of gentle massage conducive to their welfare. After heavy slumber many instinctively overcome the inactivity of the lids by rubbing them, and it is a common practice to do this in order to see more clearly and to free the eyes from secretions.

Reibmayr points out that the reflex effects of massage can be studied upon one's self. He mentions the following uniformity of results: With both eyes closed, the one that is not being *masséed* will show a decidedly greater enlargement of the pupil than the other within the first minute. But with the continuance of the massage, the pupil of the same eye that is not *masséed* becomes smaller than the other in the second minute; at the end of the third minute the pupil of the *masséed* eye is decidedly smaller than the other, both always examined simultaneously.

Klein is an earnest advocate for the use of massage in certain affections of the eyes. He makes no appeal from the experience of others. He has used it in episcleritis, phlyctenular ophthalmia,

diffuse parenchymatous keratitis in the acute stage, and in phlyctenular and granular ophthalmia. He believes massage would be of use in glaucoma where it is not a question of operation, in hydrophthalmia, in ciliary neuralgia, in supra-orbital neuralgia, and in idiopathic blepharospasm.

"It is easy to understand," says Klein, "what massage effects when we reflect how many cases of chronic inflammation there are that leave behind them relics that are almost immovable; thanks to its intervention, one is in much better condition to break up artificially the vicious circle. An inflammation with an abundant exudation provokes a deposit of new products, which on their part become the cause of a new inflammatory irritation and the formation of other deposits. All these will disappear as soon as the obstructed stomata become permeable. Most of the methods employed obtain this result in one case or another, but in the majority of those of which it is here a question they fail. How should we proceed in the case of pannus become permanent? If the nutritive and productive source, conjunctival granulations, exists, it is to these that the therapeutics will be directed. The ordinary means are absolutely without action against pannus when there are no conjunctival granulations. The insufflations of calomel, the instillations of divers liquids, are no other than irritants. What use are excitations of all kinds if the preformed products cannot find a way out? We incise part of the conjunctiva to make the vessels disappear which nourish the pannus, and new vascular connections establish themselves very quickly.

"The inoculation of pus alone answers the physiological postulate; it produces new ways of absorption and sets free the old ones. But at the same time it determines a veritable revolution in the structure of the eye; it always puts it in peril, sometimes destroys it. With massage it is quite another thing; here it is no more than a simple irritant, but capable of reëstablishing the permeability of obstructed ways, of breaking up the pernicious progress. It is without peril, efficacious and mild, yet active and well supported by the patient. With all other procedures a good deal of time is required in successful cases; massage shows its favorable effects very quickly." (*Wiener medicinische Presse,* 1882.)

Professor Hirschberg reports the case of a female, twenty-six years of age, who suffered from insufficiency of the mitral valves.

The variations in the filling and emptying of the blood-vessels of the *fundus oculi* could be accurately seen with the aid of the ophthalmoscope. Massage of the bulb by pressing this against the orbit was used from the day after the blindness and was repeated twice daily. On the second day sight returned in one part of the field of vision, and on the third day this was more extended, and was confirmed by ophthalmoscopic observation so far that the vascularization of the retina appeared everywhere almost normal. Yet the field of vision was limited, the arteries attenuated, the papilla pale.*

To have the effects of massage upon other parts of the body which are hidden from view seen, observed, and confirmed in the structures of the eye by oculists of the highest eminence is more pleasing and satisfactory than words can express. I venture the prediction that in all probability the best results will yet be obtained in affections of the eyes appropriate for massage by combining its local application with that of the head and face, whereby a much greater influence will be exerted upon the fifth pair, vasomotor, and sympathetic nerves, and a better revulsive effect obtained than by local massage alone.

MASSAGE OF THE EAR.—In otology less than in any other branch of medicine has massage been found necessary. After the healing of the incision for the evacuation of the contents of *othæmatomata* in two cases Dr. Clarence J. Blake sent them to me for massage. With a very few applications of this the slight puckering and induration of the auricle disappeared and the tissues became supple and of natural appearance. Compression had been previously used by Dr. Blake, and there seemed but little left for massage to do. Perhaps I underestimate the importance of the procedure, for Meyer (*Archiv für Ohrenheilkunde,* XVI., p. 161) says that no other method of treatment can prevent the resulting disfigurement of the auricle. He mentions three cases in which after the incision had healed massage and compression restored the auricle to its normal condition and appearance in one week. Politzer recommends massage and centripetal stroking over the region of the mastoid process, in front of the ear, and upon the side of the neck as a means of relieving the pain of *otitis externa*

* Centralblatt für Augenheilkunde, Vol. VIII., 1883.

and furuncles of the external auditory canal, especially when other procedures cannot well be used; but incision and local applications should not be neglected. Massage in these cases has a powerful depletive effect, diminishing the redness and swelling of the mucous membranes in the narrow canals of the auditory apparatus. The antiphlogistic effect of centripetal stroking of the neck has proved very efficacious in inflammatory conditions of the Eustachian tube and middle ear according to Gerst.* Massage is said to have been very beneficial in "nervous deafness," whatever that may be (probably an affection somewhat like amaurosis before the ophthalmoscope was discovered—"a disease in which both patient and physician were blind").

Hommel † discards the usual modes of mechanical treatment of the membrana tympani and ossicles and advocates a new method, which he styles "*Tragus-Press.*" Acting upon the supposition that pressure of the tragus upon the meatus renders the canal air-tight and condenses the air therein sufficiently to act directly upon the membrana tympani, he releases the pressure upon the tragus, and the sudden escape of the compressed air produces traction upon the membrane. Compression and attraction of the membrane are thus rapidly produced by exerting and relaxing pressure upon the tragus. Hommel suffered from chronic catarrh of the middle ear, experimented in this way upon himself, and found that his hearing was improved within several months from ten and forty centimetres from the watch to one hundred and fifty and six hundred and ten centimetres. A similar result was obtained in a boy thirteen years of age, who suffered from a perforation on one side and thickening and retraction of the membrane on the other. Prior to this mode of treatment the watch was heard only at five centimetres by the left ear and twelve by the right. After nine months the hearing power had improved to one hundred and sixty and three hundred and forty centimetres respectively. Hommel advises this mode of treatment in (1) chronic catarrh of the middle ear; (2) perforations of the membrane, the handle of the hammer still being in connection with the membrane; (3) in thickening and opacities of the membrane; (4) as a prophylactic measure against deafness developing in old age.

* Gerst: Massage. Würzburg, 1879.

† Archiv für Ohrenheilkunde, Bd. XXIII., p. 17.

For this purpose a much more agreeable and efficacious method than that of Hommel is to apply the hand so that the muscles in front of the metacarpal bone of the thumb will fit accurately into and over the auricle (see Fig. 63), the right hand for the left ear, the left for the right, and by making moderately strong circular kneading upward, backward, and outward powerful but pleasant compression and suction are created which have none of the disagreeable feeling of shooting peas into the ear that the "tragus press" of Hommel has. Indeed, Hommel's method makes no suction at all, for the compression of the air that it causes is so slight that its sudden liberation cannot produce any appreciable vacuum, as claimed by its advocates. That benefit has resulted from it there can be no doubt, but we must look for a reason other than that given, and it is undoubtedly this: that as the vessels of the cavity of the tympanum and drum membrane anastomose at the tragus, alternate compression and relaxation of the tragus produce a pump-like action on these vessels which draws the blood outward, thus making the circulation proceed more lively, bringing more nutritive material and removing more waste products, as massage does in any other part of the body. The more agreeable method which I advocate possesses the same advantages also and affords much more decided compression and suction of air in the external and auditory canal. When desired the auricle also can be grasped at the same time by the fingers behind it, and a circular traction with the strongest pull upward, backward, and outward exerted; but this does not afford so much compression and suction as when the auricle is not grasped. These procedures can be advantageously varied with *effleurage* of the neck, so as to rapidly aid the return of blood and lymph, and thus deplete not only the ear but the whole head as well. The head and face may also be manipulated, which, besides its revulsive effect, will also have a sedative influence upon the ear by means of the communication of the fifth pair of nerves with the otic ganglion.

Since I first published my method of *masséing* the ear, some years ago, in the Boston *Medical and Surgical Journal* numerous instruments have been devised for this purpose, and results mostly favorable have been reported from their use. That of Dr. Chevalier Jackson, of Pittsburg, called the *pneumatic masseur,* has been put to a very impartial test at the Manhattan Eye and Ear Hospital in New York, and in twenty-two cases of chronic catarrhal inflamma-

Fig. 63.—Position of the hand for massage of the ear.

tion of the middle ear associated with tinnitus two were unfavorably influenced and twenty more or less benefited, which is certainly a very good showing. The use of this instrument was apparently contra-indicated in cases where the existing retraction of the membrana tympani and malleus caused an increased intralabyrinthine pressure. Here let me say that suction made with the tip of one of the patient's own fingers would probably have been beneficial.

Instrumental massage of the ear has been pretty freely discussed by the aurists, some of whom are in favor of it, while others are not. One of them wondered whether this or that exploited apparatus would be as efficient under the table as on the top, for he thinks that the mental effect on the patient is certainly no small part of the supposed potency of some of the latest patterns. Dr. Alexander Randall, of Philadelphia, who is a thorough believer in the beneficial effects of massage of the ear by hand, says of other methods: "Numerous devices embodying rhythmic vibration have proved seriously destructive to the vitality of nerves and other tissues; thus the electrically moved tuning-fork will render cataractous the lenses of small animals kept near it, the electric plugger of the dentist has been abandoned because it killed the dental pulp, and at least every form of '*phonomassage*' has proved damaging to the cases which at first seemed to be benefited by its employment." Another aurist, referring to his experience with phono- and pneumomassage of the ear says that it should not be forgotten that it can be carried to an extent which will produce boiler-makers' deafness.

When some of those distinguished gentlemen have invented a machine that cannot only *masser* the ear but also the side of the head and neck as well as can be done by the human hand, then we will hear still better reports of the effects of massage in aural troubles. An army surgeon who had suffered long from intolerable tinnitus came to me. He returned the following day and reported that after the first massage of his neck, head, and ears the noises in his head were bearable, but the deafness was no better, and as he was going away he wished me to give him a lesson in massage, so that he could do it for himself. He had been previously instructed to use Hammel's method by an excellent aurist, but without benefit.

A boy fourteen years of age, of stunted growth and parchment-like tissues, but in good health and tough as hickory, for he had

walked fifteen miles at Chamonix two years before, came to me in 1893. He had suffered with his tonsils and had been more or less deaf since he was five years old. Before massage he could hear my watch at three inches with the right, four inches with the left; after massage, four and five inches respectively. His tissues became suppler, his improvement was steady, and in six months he could hear the same watch at forty-three and thirty-six inches before massage, and at fifty and fifty-two inches after. I saw him a year later and he still held his improvement.

In catarrhal affections of the *nose,* of the *pharynx,* and of the *larynx* Gerst has used centripetal *effleurage* of the exterior surface of the neck, which exerts an aspiratory force, here as elsewhere, in depleting the veins and lymphatics, and the results have exceeded his expectations.* To 1879 he had treated in this way twenty-one cases of acute catarrh of the pharynx; ten cases of nasopharyngeal catarrh; nine cases of catarrh of the larynx; two cases of catarrh of the larynx and pharynx in consequence of syphilis; one case of catarrh of the nose and of the pharynx with ulcerations of the nasal mucous membrane (*ozænasyphilitica*); one case of chronic catarrh and ulceration of the larynx in a patient with phthisis.

In all of these cases but the last one Gerst's anticipations were "brilliantly fulfilled." In the acute cases, even after a single sitting, the following improvement was observed: decrease of redness and tumefaction of the mucous membrane of the eyes, nose, and throat; disappearance of feelings of heat and pressure; respiration easier; burning sensation in the throat in catarrh of the larynx was lessened and the voice became clearer; dysphagia and sensation of pressure diminished in pharyngeal catarrh, and the symptoms of hyperæmia of the brain and congestion of the frontal sinuses were also markedly lessened. Recovery ensued from repeated massage in astonishingly short spaces of time: on the average in the cases of nasopharyngeal catarrh in 3.2 days; in those of pharyngeal catarrh, 1.8 days; in those of laryngeal catarrh, in 3.5 days. In the two cases of *angina* and *laryngitis syphilitica* which had been previously treated with mercurials recovery took place in the local symptoms in one case in five days and with the

* Loco citato.

other in seven days; and in the one case of *ozænasyphilitica* which had previously been medicated locally and constitutionally recovery is said to have occurred in twelve days.

We cannot think that a military surgeon of such high standing as Dr. Gerst wishes to convey the impression that he would not use specific remedies where indicated before, after, or with the massage. His intention is doubtless to show the effects of massage upon local processes of an inflammatory nature.

Massage is being applied to almost every accessible part of the human body, inside and out. Aspirants for fame are now as zealous in proclaiming its virtues as they were, not many years ago, in denouncing the same as vices. We used to think that it was a very great annoyance to have an intrusive fly buzzing in our nose, but according to the teachings of modern science, if he had only buzzed fast enough it would have given us great pleasure, for this would have been vibratory massage. During the ten months prior to 1895 Dr. J. Mount Bleyer, of New York, had treated two hundred cases of simple hypertrophy of the turbinated bones by means of electro-vibration or faradic massage with results that were far better than those derived from medication or surgery or both together. He used an instrument that gave from one to one hundred thousand vibrations a minute to an electrode introduced into the nose, and found that when the interruptions of the current were slow the sensation was very disagreeable, but when rapid and fine the sensation was pleasant and enjoyable. He used from ten thousand to fifteen thousand vibrations a minute and the *séances* were from twelve to fifteen minutes. Immediately after the first sitting the turbinated bones were reduced in size and breathing became possible through the side of the nose that had previously been obstructed; the secretions became more abundant and the entire head had a feeling of clearness. After each sitting a strong solution of alum was applied. It is a consolation to learn that there are no contra-indications to this method. With a little soap and water, vaseline, or cold cream on the end of a little finger patients can *masser* the lower part of the interior of their own noses with good effect.

"Science consists of human experience tested and placed in order."

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